

RD Sage
1965

①

7 July

~~At~~ Nylocopa sp.
Playa Conch, sea level, Guanacaste Costa Rica
15:20 - 18:10. On two Flamboyant
Trees Steve & I got 17 Megachile & Nylocopa. They were coming to the
flowers for nectar. The one tree in
which we got 10 of the specimens was
about 50 ft high & 50-60 ft across. The bees
were quite abundant in the higher parts of the
tree. On two occasions (16:10 & 17:30) I
counted at least 4 different bees in the
tree. The bees remained active until
18:05. At 18:00 The sun disappeared below
the horizon. At 18:10 I got one Eubema
and no Nylocopa were seen or
heard. There were a couple of occasions
when the bees were working the same
bunch of flowers and were as near as
4-6 inches from each. There was no
apparent aggressive action by either
bee in these instances. There were three
species of hummingbirds working the tree.
There were no encounters between the
bees and the birds. All of the bees
I saw flew away from the tree
in a northerly direction -- but this
may be a biased observation as
I spent little time on the south side.

R.D. Soghl
1965

(2)

Xylorhiza sp.

Playa Coco, sea level, Guanacaste, Costa Rica

7 July.

Most of the bees were active in the upper parts of the tree and it was necessary to climb up into the branches in order to secure about half the specimens. The bees seemed to come in waves. They would be numerous 4-5 for about five minutes, then it would be hard to find them & then after ten minutes or so there would be many bees working again.

8 July

Arrived at the first tree we collected at yesterday at 06:23. There were bees active at that time. This tree is smaller and is about 30-35 ft high & 40 ft wide. It is about 100 yds west of the larger tree where Steve is watching.

06:30 3 bees. all on north side of tree near top. Took three pictures of the flowers and the tree.

06:46 6 bees working all around the tree.

(smaller bee)
06:56 1 bee hit 10 flowers in 1 min 15 sec.

07:00 6 bees working around tree evenly distr.

07:15 6 bees working all around tree (none of the larger ones seen).

R.D. Sage
1965

Xylocopa sp

Playa Coco, Guanacaste, Costa Rica

8 July 1965

Wind has come up but this does not appear to hamper the bees

07:30 7 bees (all small) evenly distributed around the tree

07:45 5 smaller black bees working all around the tree.

08:00 4 bees (small) working all sides of tree

08:15 5 bees all around tree. all small.

08:37 4 bees all small around tree. There was a fairly strong breeze blowing during the count.

08:45 4 bees working all around the tree.

There was still a breeze. There are more butterflies working the flowers now. They look like white pieridae.

09:00 3 bees working SW corner of tree. Breeze was slight

09:15 4 bees working around the tree.
+ 1 Eulima.

09:30 4 bees around tree.

09:45 3 bees around tree

10:00 No bees around the tree. Stingless bees with yellow abdomens still active. Cloud just past overhead after I finished the count.

10:15 No bees on tree

10:30 1 bee on tree.

XylocopaPlaya Coco, sea level, Guanacaste, Costa Rica

8 July

10:45 2 bees were on tree. I found one sitting on underside of leaf while I was walking around. After a few seconds of observation it flew off. The other one suddenly flew away but I don't know whether it too had been resting. It was definitely not working the flowers.

11:00 heard no bees working the tree

11:15 one bee on tree

11:30 No bees on tree.

12:10 1 bee working NE side

12:30 No bees present

12:45 Heard no bees active on tree

13:00 No bees heard on tree

13:15 No bees working the tree.

13:30 1 bee working NE corner of tree.

13:45 2 bees working tree. 1 on NE and 1 on SW side. One ^{of these} arrived from the NE so I got up to make the count.

14:30 No bees working the tree.

14:45 4 bees working tree on all sides

15:00 No bees working on the tree.

15:15 No bees working the tree.

15:45 No bees working the trees.

16:00 Two bees on the tree. Saw them only as they flew away.

RD. Sage
1965

(5)

Xylocopa sp.

Playa Cocor, sea level, Guanacaste, Costa Rica

8 July

16:15 2 bees on tree. Spotted them only as they left. They don't seem to be as obvious as they were in the morning.

16:30. No bees working the tree ~~despite~~

16:45. No bees working the tree. However I did find one resting on underside of a branch on the NE side of tree. Just after I finished counting a strong wind ~~up~~ came up which blew flowers to the ground.

17:00 1 bee working flowers on NE side of tree. Wind is still blowing

17:15 2 bees working in the tree. One on the east & one on the west side.

17:30. 1 bee working the NE. side of the tree. What may have been a smaller brownish *Xylocopa* flew off as I rounded the SW side of the tree.

17:45. No bees on tree. The sun is low on the horizon now but still above the horizon.

— There were no observed interactions between the bees and the dragonflies which hovered over the tree most of the day.

18:00 No bees on tree. Sun has disappeared below horizon.

Xylocopa sp.

Playa Coco, sea level, Guanacaste, Costa Rica

7 July

0525. Arrived at the same tree I was on yesterday.

There were bees active. The sun had not yet come up at that time.

05:30. 5 bees working all around the tree.

05:45. 5 " " " " " "

05:55 The sun just came over the hill.

06:00 9 bees working all around the tree.

06:15 5 bees working all around the tree.

06:30 4 bees working all around the tree.

06:45 7 bees work all around the tree.

07:00 5 bees working all around the tree.

07:15 8 bees working all around the tree.

There were some of the larger bees working this time & during the last count.

07:30 6 bees working all around the tree with large bees present.

07:45 5 bees working all around the tree including 2 large bees

0800 3 bees working all around the tree

11 July 1965

05:30 checked out a field where Steve had found *Xylocopa* a couple of days ago. The site is a large grass field in which these legumes are irregularly dispersed in single plants. They probably average

RD. Saye
1965

Xylacopa

⑦

Playa Cocos, sea level, Guanacaste, Costa Rica

41 July 1965

about 10-15 feet apart from one another. When I arrived at 05:30 the flowers were still closed up and of course there were no bees. The field is bordered on the SW side by a swampy area, on the NW by acacia forest, on the SE by a road and then a corn-field, and on the NW by houses and the road. The grass was about 2 ft high when it was growing undisturbed. The legume plant was a little shorter, 0555. The sun hit the first flowers in the SW corner of the field.

06:00 No bees, flowers still closed

06:30 No bees flowers still closed

07:15. No bees. Hummingbird (green) visiting flowers.

07:30. No bees

08:00 No bees.

08:30 No bees. Many ~~no~~ monarch-type butterflies at the flowers.

09:00 No bees. A strong wind has been blowing since 08:30

09:30 No bees ~~also~~

10:00 No bees. Strongest gusts of wind so far.

10:30 No bees. Wind still blowing.

RD. Sohl
1965

8

11 July

Xylocopa sp.

Playa Cocos, sea level, Guanacaste, Costa Rica

10:50. First bee. large black. Time it took to visit 10 flowers 1 min 15 sec. (caught it.) It forcibly crawled into some of the flowers which were unopened. Examination immediately upon capture showed yellow pollen on abdomen and legs.

11:00 1 bee (large... similar to one just taken).

11:10. Another large bee visiting yellow legume. While trying to count its rate of flower visitation I chanced on a small patch of a blue flower & there was a *Schoenherria* visiting these tiny flowers. The distance between the two bees was about 10 ft. I don't think the large bee could even land on these smaller flowers. My impression was that the *Schoenherria* was a faster flying bee... more like a hover fly. Caught the animal. Examination did not reveal any pollen on this animal.

Schoenherria 10 flowers / 9 sec. 11:25

" 10 " / 10 sec "

" 10 " / 10 sec "

11:30 1 large black bee working yellow legumes

11:30 3 *Schoenherria* on blue flowers.

12:00 5 large black bees on yellow legumes.

R.D. Lyle
1965

9

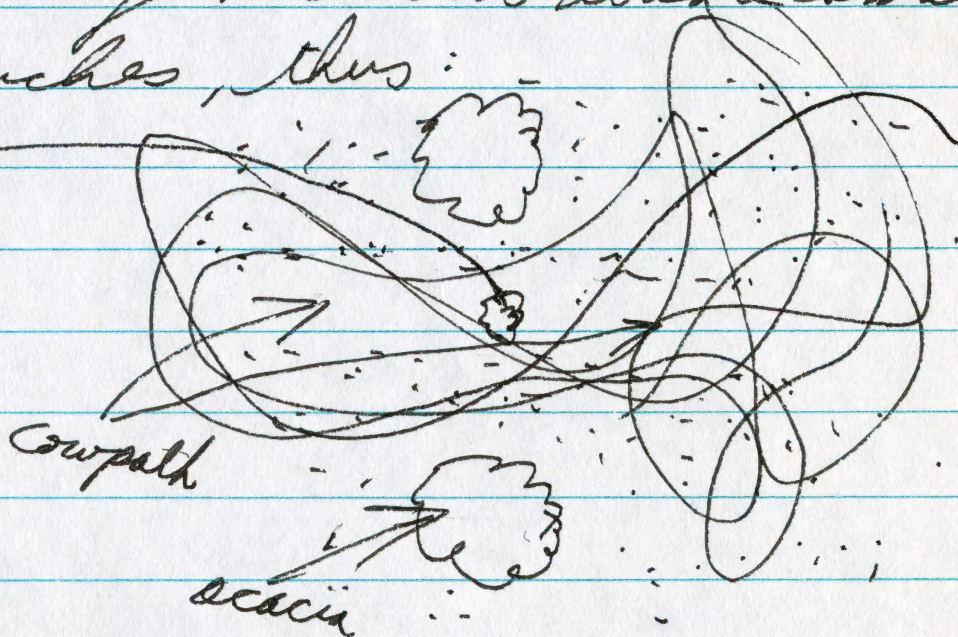
Xylocopa

Playa Cocos sea level, Guanacaste, Costa Rica

11 July

12:08 Noted a *Schoenherria* (? ♂) over some grass in the field. It chased at a small white butterfly. I watched it. It flew in irregular figure 8's about 3 ft high. It ranged as far as a 20 ft diam. but mostly flew 8 ft. The area it flew over was a low part of the grass between two bullthorn acacias 5 ft tall & 7 ft apart from one another. This was thirty yds to the SE of the flowers the others were visiting. The animal flew just over the tips of the grass. In between the two larger acacias was a small one 20 inches, thus:

small
acacia.



The animal disappeared at 12:18
Just prior to making the 12:00 count I collected a *Schoenherria* from the blue flowers. I watched it visit 8-9 flowers of the blue and it had to go out of its way in order not to attend

Journal

Xylocopa sp.

Playas Cocos, sea level, 6 navesate, Costa Rica

11 July.

to one of the yellow legumes which was growing in the midst of the blue flowers

13:20 Returned from lunch & immediately checked

the blue flower patch. A large black Xylocopa was visiting the blue flowers. It also attempted to visit another yellow flower (see unsuccessfully once and then successfully on the second try. The first time it landed on the flower the lower petal fell off. There was one Schoenherria visiting the flowers at that time.

13:45 checked the spot where the Schoenherria had been defending a territory but no bee was there. Strong gusty breezes still blowing. Apparently doesn't hinder bee activity.

14:00 7 black bees working the field

Shade is covering the first flowers in the S.W. corner of the plot.

15:00 7 ~~the~~ black bees working the yellow legumes. 1 Schoenherria on the blue flowers. It may be that the total number of ~~the~~ Schoenherria were only those which I caught earlier & this one.

15:30 10 bees working yellow flowers. No Schoenherria blue on

RD. Sage
1965

(11)

Xylocopa sp

Playas Cocos, sea level, Guanacaste, Costa Rica

11 July.

16:00 6 bees working the yellow legumes.
Possibly one *Schoenherria* but couldn't
be certain.

16:20 No bees on blue flower.

16:30. 9 bees working yellow legume.

17:00 6 bees working yellow legumes.

17:20 No bees active on blue flowers.

17:35 4 bees working flowers. All of the flowers
are now in the shade.

18:05 No bees on yellow legume. No bees on
blue flower. Sun had disappeared. The
yellow legume flower was still
open.

12 July

04:50 Checked out the flamboyant tree
for *Xylocopa*. Stood under the
trees in the poor light but was
unable to hear any bees. Returned
to the *Schoenherria* site of the blue
flowers at 04:55 I couldn't see
any at that time.

05:30 Looked around from where the blue flowers
were and discovered a few feet away a
bush of white flowers upon which
the *Schoenherria* were abundant. I checked
out the surrounding brush patch and found
7-8 of these plants in varying degrees of flower.
There were 7 *Schoenherria* on these plants

RD. J. J. J.
1965

(12)

Xylocopa sp

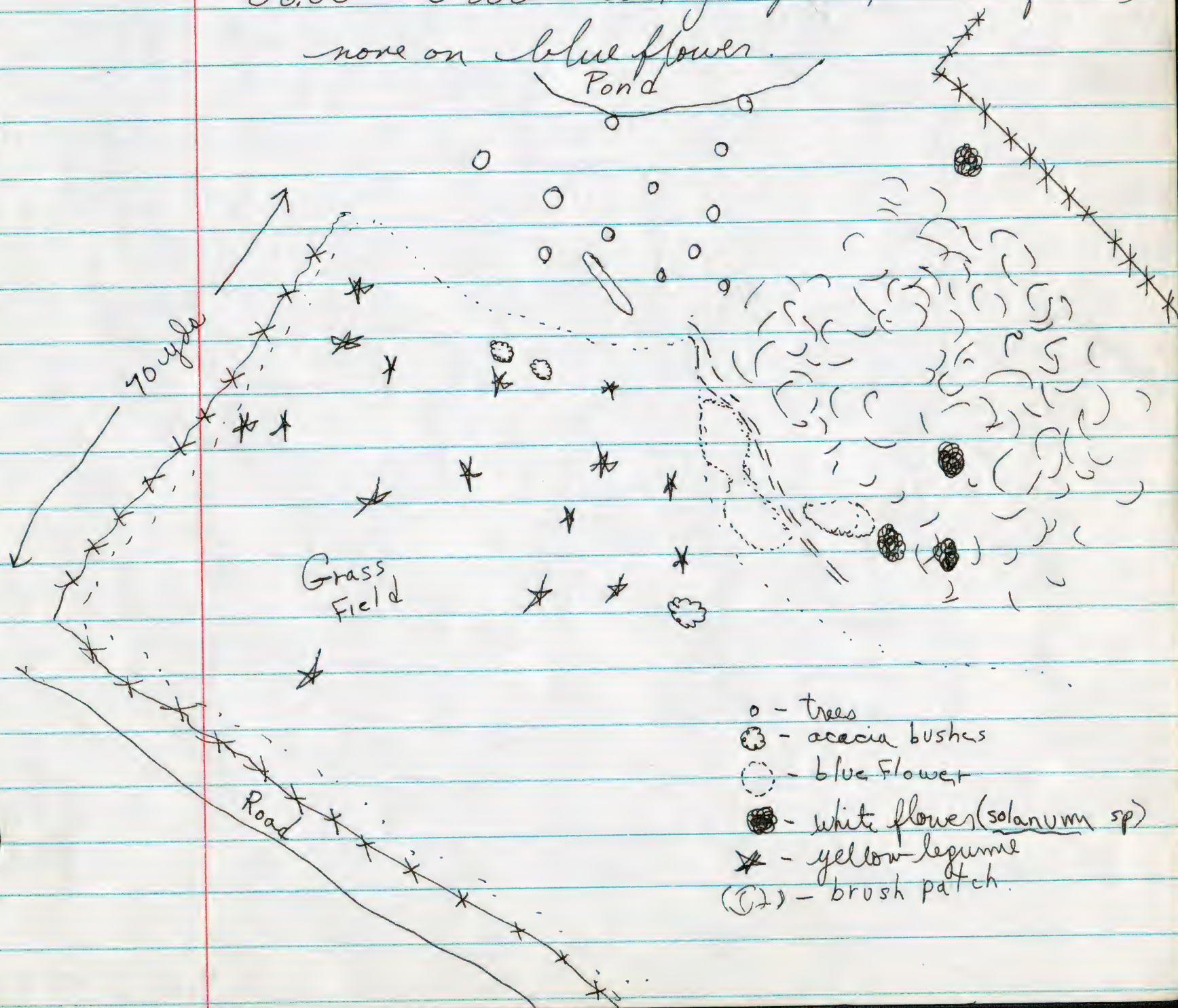
Plova Cocos, sea level Guanacaste Costa Rica

12 July

There was also *Eulima* and a bright metallic green bee working one bush that was off to the side of the main group of plants. The *Schoenherria* were collecting pollen as their underparts and insides of the legs were white with pollen.

A general picture of the whole area is as follows.

06:00 3 bees working plant (white flower)
none on blue flower.



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1965

(13)

Xylocopa sp.

Playa Cocos, sea level Guanacaste Costa Rica

12 July

06:30 2 ^{*Schoenherria*} bees on white flowers, none on blue

07:30 2 *Schoenherria* active on blue flowers -- collected
a ♂ (♀) 1 *Schoenherria* active on white
flower.

08:10 No *Schoenherria* on either flower.

16:40. No bees on blue flower or white flower. Eight
large black bees on yellow legume. Took
about 10 pictures of the yellow legume and
the blue flower.

13 July

06:15 - 08:00. Walked down the beach to a
hedge of pink flowers facing the
ocean. They were part of the front fence of
a house. At 06:35 I found the first
~~*tabaniformis*~~ ^{*subvirescens*} visiting these flowers. I hadn't
come prepared and tried to catch the bee
in my handkerchief but it stung me and
got away. There was another *Xylocopa*
but smaller with only one white band
on the abdomen but I didn't get it. At
06:40 when I left for breakfast there
were three large black ones there also.
Returned after breakfast and watched the bushes.
Got one at 07:50. These bees fly much
faster and more erratically than the other
two groups I've worked with. They behave
like house flies.

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(84)

Xylocopa sp.

Playa Coco, sea level, Guanacaste Costa Rica

13 July

18:00 - 18:30 - No bees visiting flowers (pink)

14 July

05:45. 1 large black bee and 1 *Schoenherria*
visiting pink flowers. -- no ^{subnervosa} ~~talamancensis~~.

06:00. No bees on flower.

06:15 " " " "

06:30 " " " "

07:00 " " " "

08:00 1 bee working the flowers

08:30 no bees working the flowers

09:00 " " " " "

09:30 " " " " "

17:05 - 17:20. Returned to the field of yellow legumes. Checked the white flowers and blue flowers near them but there was no activity on them. On the yellow flowers I took 6 large black bees in that period. No more appeared.

15 July

05:50 - 06:00 Took three *Schoenherria* off of the group of white flowers which Steve had been watching for the last couple of days. There was a fourth *Schoenherria* but it got away. Got a fourth bee about 50 yds away on an isolated bush of the white flower.

06:03 - 06:12. Got three bees on the same kind of white flowers in the area I watched a couple of days ago. Three bees got away here.

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(15)

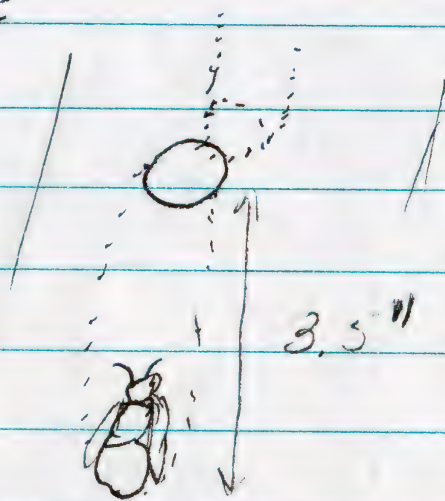
Xylocopa sp

15 July

Playa Coco, sea level, Guanacaste, Costa Rica
08:30-09:00. Returned to the hedge of pink
of bouss and collected miscellaneous series of
bees but no *Xylocopa* seen.

16 July

7.6 mi NE. Las Cañas, via Hwy 19, ^{1200ft} Guanacaste Costa Rica
17:05. Found a nest in a fence post
making up a horse corral. The nest
opening faced to the east and was
about 24 inches above the ground -- 20 inches
above the grass. The hole was burrow was
as follows:



The bee was sitting in the bottom
of the burrow with its head facing
up. There was another burrow going up
and into the log from the entrance.
The bottom of the burrow was empty. The
burrow was about $\frac{1}{2}$ in before it started
to drop down. Took two pictures of the nest
at this point with the recently killed bee in
position as I discovered it. We then began to
excavate the upper tunnel. By the time we

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(16)

Xylocopa sp.

7.6 mi NE. Las Coñas, 1200 ft, via hwy 19, Guanacaste, C.R.

had finished hacking away the tunnel 6 more bees had appeared. These included 3 males and three females (one escaped). They would come rushing out one at a time about two or three strokes after I would begin chopping. ~~Bees~~ They would fall to the ground and the first two appeared very sluggish. The later ones were more active -- no doubt due to the previous warnings. We collected the bees and then hacked out the nest with a saw and hatchet. This is nest #1.

21 July

^{ESE}
1 mi S San Isidro de General, 2500 ft, San Jose C.R.

08:30 - 10:00. Collected 4 *Megamelacopa* and 1 *X. varwona* in a patch of purple flowers (5TB #). The day was clear and sunny. The *Megae*s were there during all the time we collected. They were present only as singles or doubles -- never saw more than 2 at one time. The other smaller one was flying quickly from flower to flower -- much quicker than the larger *Megae*s. I saw three of the smaller ones but collected only one. The patch of flowers was growing in a swampy area with standing running water about 2-4 in deep. The patch was thick & dense and about 25 x 60 yds. It was right alongside the road.

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1965

(17)

Xylocopa sp

1 mi ESE San Isidro de General, via rd, 2500 ft. San Jose C.R.

21 July

There were many other kinds of bees working the flowers along with the Xylocopa. There was one more mega there when we left. There were many more Bombus here than the Xylocopa. They seemed to replace the Neoxylocopa that we found at El Coco. An interesting thought.

3 mi N San Isidro de General, via Hwy, San Jose C.R.

21 July

14:00-15:00. While we were looking around for other things I noticed Xylocopa holes in some rotting fence posts. There were three holes in one and two in the other. Hacked them open and found they were all similar in being about 3 inches deep but nothing in them. They looked fresh but the stuff inside was old.

4.5 mi ESE San Isidro de General, 1900 ft, San Jose, Costa Rica.

22 July

09:05 Returned to the nest site I had found a few minutes earlier. Watched the nest site until 10:30. Steve returned and we went over to the flower patch. It followed a stream through a meadow ~~was~~ is the place we collected yesterday. It was about (80 yds long N-S) by 5-10 yds wide. Between 10:30-11:30 took bees. No Schoenherria seen. The Megs would make large sweeping flights over the

R.D. Sager
1965

(18)

Xylocopa sp

22 July 4.5 mi ESE. San Isidro de General, 1900 ft., San Jose, Costa Rica
patch. Could find no *Schoenherria* there.
Left the

26 July 1965 08:30 Returned to take that nest of the
supposed *Xylocopa* that I watched on the
22nd. As I was loosening the sticks which
hold the wick to the post a *Xylocopa*
fell out on the ground. It had come from a
different hole than the one I had been looking
at. I collected it & determined that it came from
a very obscure hole whose entrance was
in a crack running along the log. The entrance
was on the east side of the post approximately
2 ft above ground level. The fence enclosed
an open field to the east. There were
small shrubs in the field but for the
most part it was bare. The purple flowers
we took large bees on was 100 yds further
east but down the slope 50 ft in elevation.
I cut out the nest and took the larva
which was in it. This is nest #2. The
nest post was a mixture of rotten & solid
wood on the inside. Berto had a nest in other
parts. The tunnel of the bees nest angled
upwards so that the chambers were
above the entrance on the post.

Arrived at the flowers at 09:08. There
were no *Xylocopa* in evidence although *Bombus*

R D Sapp
1965

Xylocopa sp

(19)

26 July

4 mi ESE San Isidro del General 1900ft, San Jose, Costa Rica
was abundant. The sky was somewhat overcast and this may have had something to do with it. Saw the first large black carpenter bee at 09:23. It made a large figure 8 over the flowers. I didn't see it land. Took a black *Schoenherria* like the one from the nest at 09:30. It was on the flowers. Took the large *Megachile xylocopa* regularly after that. They were all caught at the upstream end of the flower patch. I saw only one in the middle and none at the lower end. Left the area at 10:55 after collecting large carpenter bees and 1 *Schoenherria*.

29 July

~~San Jose~~ San Jose, Costa Rica

08:45 Collected a *Schoenherria* off of a blue flower (STB #). The blue flower formed part of a hedge with a pink flower (STB #) which overlapped a fence. The place is collected for bees by people at the university (including Michener). It is called Las Joses.

R. D. Sage

1965

(20)

Xylocopa sp.

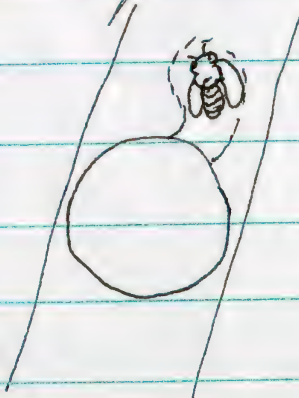
5.5 km SE. Desamparados, 1260 m, San Jose, Costa Rica

3 July 1965

10:15 - 12:30. Returned to check a supposed carpenter bee nest I thought I had found a couple of days earlier. Steve sat at this nest, which is #2. He discovered another nest on the other side of the same stump. The bee(s) in this nest were active and we determined that these were *T. uniformis*. It was sunny but warm. I went out & checked for nests in other likely looking stumps & dead trees. Found 4 more in the immediate vicinity.

Nest #3 was very peculiar. I found the nest by accident. I had climbed a dead tree & was chopping off a dead branch to check some large holes. The branch snapped off and fell to the ground & broke into 3 pieces. A carpenter bee (*Megaxylocopa*) fell out of a shallow nest (Nest #3). The branch was about 15 feet above the ground at the nest site. In the same piece of wood was a little green bee which I discovered when I split the wood open. Captured same.

Nest #3



(Cont. on p 23)

The wood is very soft & can be torn apart by

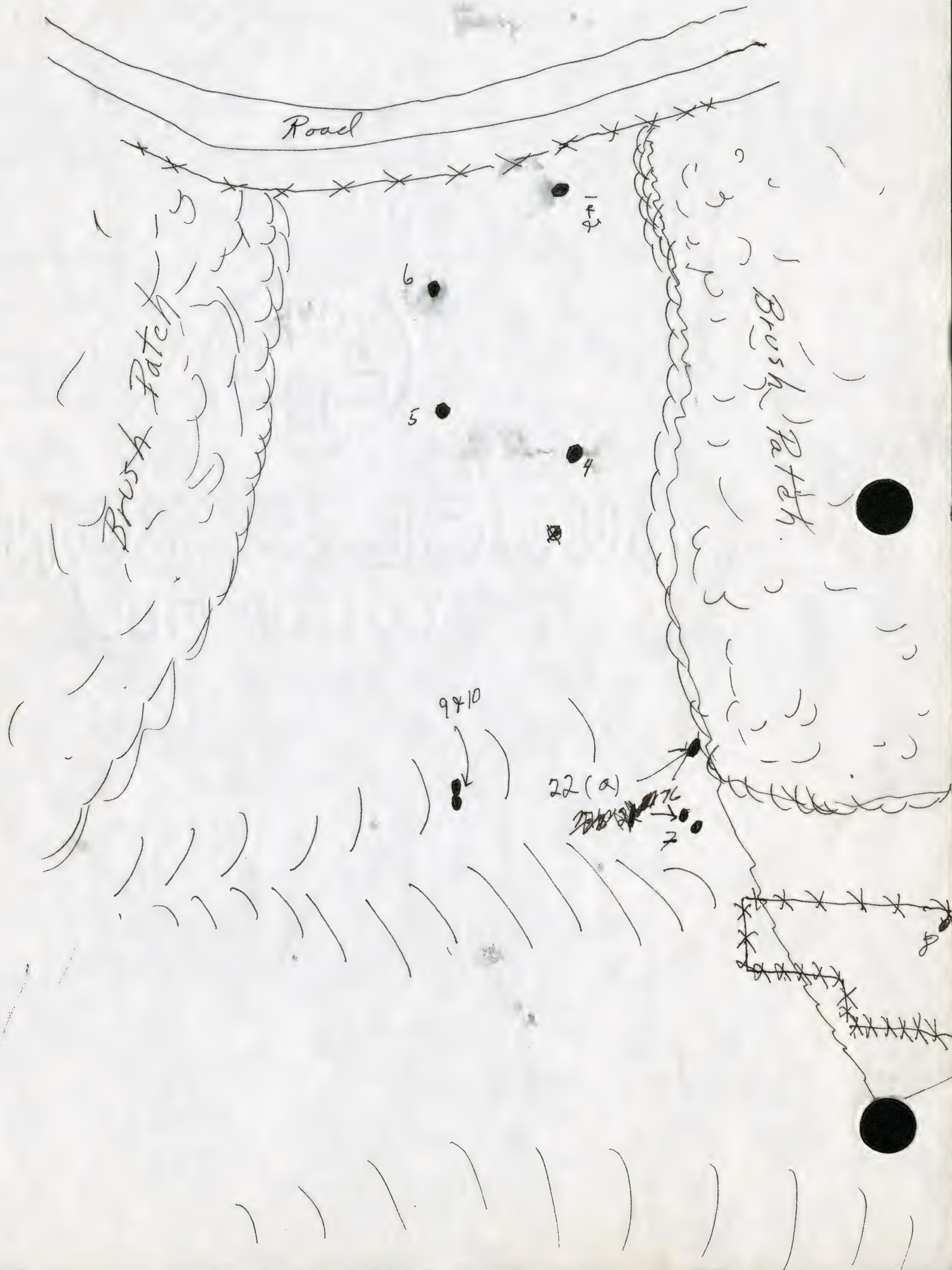
Xylocopa sp.

● active
⊗ inactive

(21)

6.5 km SE. Desamparados, 1260 m, San Jose, Costa Rica

31 July



RD Sage
1965

xylocopa sp.

5.5 km SE Desamparados, 1260m, San Jose, Costa Rica

31 July

1

Upper nest - X. tabaniformis

2

Lower nest - Tabaniformis.

* 3

Dead tree with 1 Megaxylocopa. (see pp. 20) taken
on 31 July 1965.

4

in small stump schoenherria

5

~~Megaxylocopa sp.~~

6

X. tabaniformis

7

in dead tree, in fork, 7 ft above ground, ~~xylocopa~~
sig. active

8

Possibly abandoned

RD. Dap
1965

(23)

Xylocopa sp.

31 July

5.5 km SE Desamparados, 1260 m, San Jose, Costa Rica
land. Took another abandoned nest that
apparently the woodpeckers had broken into
(Nest #19). Left the site at 12:30. Returned at
14:30. Looked for more nests in the open field.
I found two more & Steve found 8. The
nests were found ~~in~~ most frequently in the dead
branches of a tree of the family
Melastomaceae. Took an abandoned nest
(Nest 19) from such a tree (Sec 5TB Bot#)
It rained for a few minutes at 16:00. Left
at dark. Steve collected Nest #18 by
accident. It contained 14 *Megacyllacopa* (4♂♂, 10♀♀).

1 August
32 July

Nest #4. Bee in hole after probing. 09:45
Nest #6 at least 3 tabaniformis 09:50
10:10. Nest 22 5 ft off ground in dead tree
Trunk. entrance at 135°. Entrance ~~covered~~
and ~~inner~~ outer part of hole encrusted with fungi.
Entrance 33 x 12 mm
attack hole of
woodpecker?

Bee present after probing.
10:15 checked #7. bees in it. Discovered another
nest in same tree (Nest 21). Bees in it. Entrance
on underside of branch



Brush.

Forest

22

74475

RD. Page
1965

(24)

Xylocopa sp

5.5 km SE. Desamparados, 1260 m ~~San Jose~~ San Jose, Costa Rica

1 August

11:00 *Schoenherria lateralis* nest discovered (Nest b)

Poked in nest & bee responded. Buzzed in a high pitched tone that could be heard w/away. Backed out to the entrance 3 times in response to probing. Would not come out head first. Did the same behavior while I was tying a label on the branch 3 in. away - but not disturbing the whole.

Abdomen was pumping in & out.

= Check and take two apparently abandoned nests NE by 10 ft from (Nest b). They are filled with debris.

12:00. (Nest 21) located in a dead log lying out in the field. The entrance to the nest was covered by spider web. Tested the burrow with a twig & got buzzing. When I sat down to write notes a black medium sized bee most ~~surely~~ surely one of the *Schoenherria lateralis*. After the first bee flew out I probed again & heard another bee.

31 July

14:45. In a field about 100 ft lower in altitude and 400 yds north of where we were working this AM. Found a nest (Nest # 22) in a spiny plant (558 Bot 76). It looked to be a large bee. It was on the underside of a dead horizontal branch. ~~It was a~~ There was a bee in it.

RD. Sage
1965

Chumee

(26)

Xylocopa sp

5.5 km SE. Desamparados, 1260 m, Cordillera de Sarapiquí Costa Rica

2 August

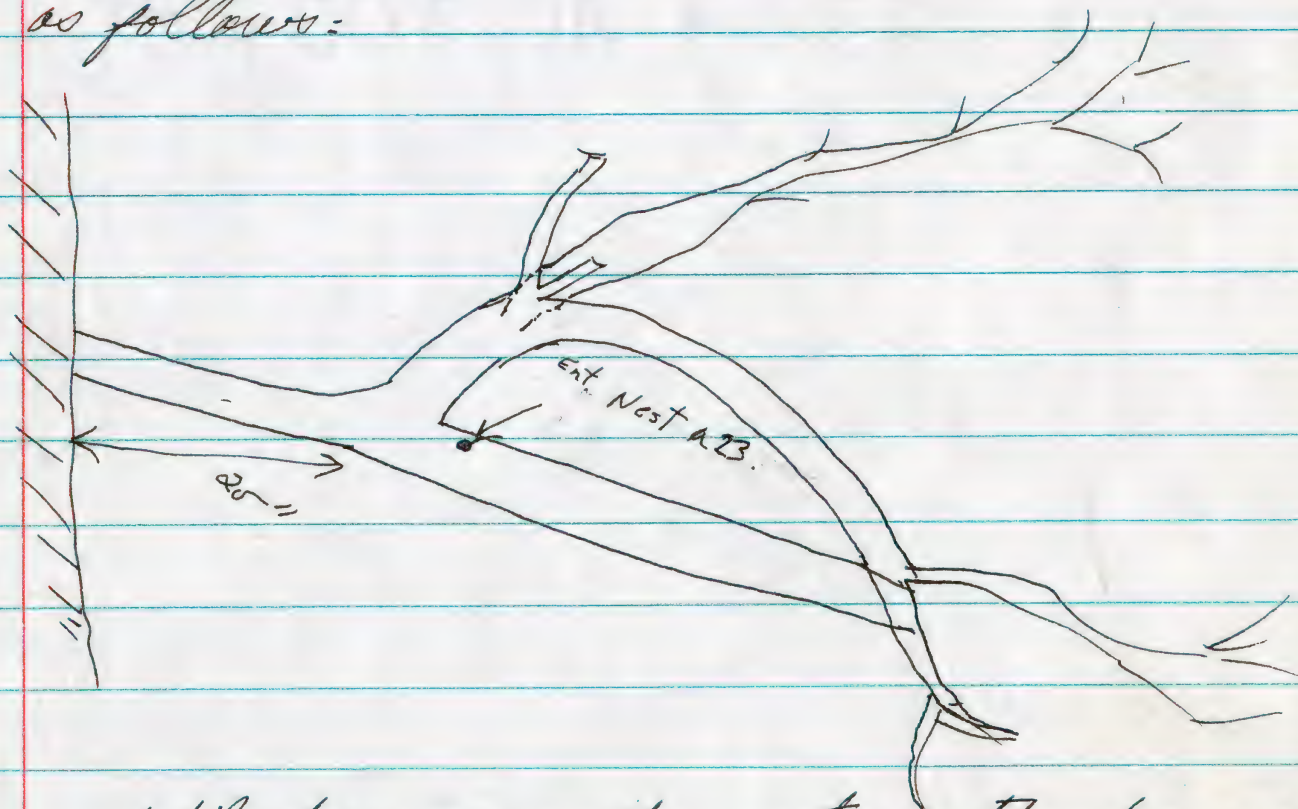
08:30 Arrived at tree containing #21 & #7. No sign

activity

3 August

11:30 Nest # 23

Discovered the tree on a N facing slope in forest. Entrance was 210° next angled upward. Chopped into tree to check another nest and these bees came tumbling out (1 escaped). Entrance was three feet from ground. The whole tree was dead. Lower part below nest contained nest of large ants (picked some). The upper part of this same branch contained other nests which had been broken into by woodpeckers. This nest entrance was in a knot-hole. Base diameter of tree was 41 cm. Tree w. shaped as follows:



While chopping open the nest another bee escaped from a small another passageway at the bottom of the where I was making my cut.

About 10-15 minutes later a bee returned to the

RD Sept
1965

(27)

Xylocopa sp

5.5 km SE. Desamparados, 1350m., San Jose, C.R.

3 August

13:00. Broke open an abandoned *Xylocopa* nest in the ~~Melastomaceae~~ tree and found a volpupid. There were also mud nests of some hymenoptera in the chambers. They were not active so I could not determine what ~~was~~ they were. Took the nest and it is accn #4.

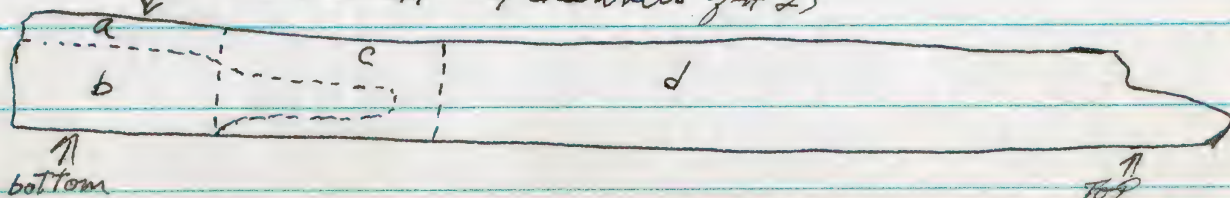
About 10-15 minutes after I had taken Nest #23 a bee returned to the tree where it had moved to -- approx 30 ft down-hill. It buzzed about the branches. It then returned to the tree from which #23 had been taken. It buzzed about -- it flew up close to the tips of the branches -- as if looking for a hole. I scared it off trying to catch it. I put the nest pole back in approx the same place as it had been. The ~~bee~~ a bee returned to the tree five minutes later and went through much the same motions -- flying about the tips of the branches. It came within two feet of the nest hole but I scared it away & it did not reappear while I was in the vicinity for the next 15 minutes.

step
schoenherria

The nest #23 consists of 9 bees (including 2 escapes). There were 2 ♂♂ + 5 ♀♀ which are pinned. The nest pole contains abandoned nests. I sawed it into

4 pieces fitting as follows

a+b contains actual nest channels of #23



K.D. Sage
1965

(28)

xylocopa sp

5.5 km S.E. Desamparados, 1350 m, San Jose, C.R.

3 August

Nest #24. Was an abandon nest that was found on a large branch which had fallen to the ground. The nest was in an abutment piece of the branch. Where I found it, it was only a foot or so from the ground & appeared much too damp to support a living bee.

See record #4 regarding inguinal lines in the abandon burrows.

There are some ants and a *Crematogaster* beetle pinned which were inhabiting the wood below the nest pole.

The two ♂♂ appear to be heavily infested with small mites. They are densest around the junction of the prothorax and the abdomen.

5 August

09:15. Checked nest #6. The straw that was put in it on the third was still present. The nest is still in complete shade at this time. The opening of nest #6 is due South (180°) and is 44 in. above the ground at the base of the tree. The circumference of the tree at its base is 280 cm, at the nest hole it is 24 cm. The base of the tree is still living. The top half appears to be dead. The tree is of the spiny species (SJA-Bot #76). Nothing had happened at 09:40. The nest opening is very obscure although it is on the plain surface of the tree trunk. There is no droppings below the entrance as we have.

RDS
1965

29

Xylocopa sp.

5 August

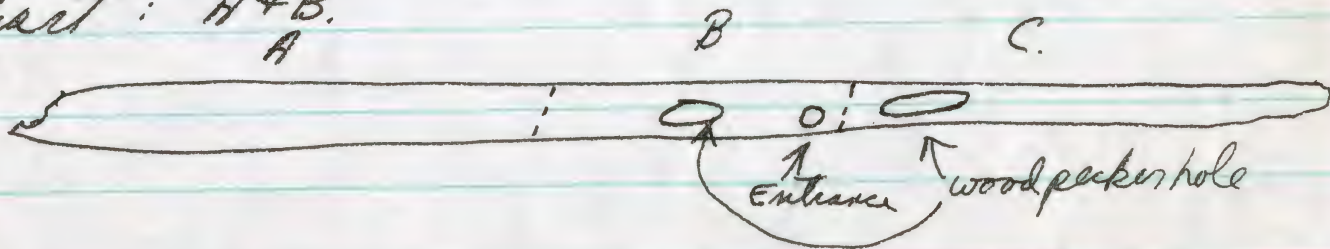
5.5 km SE Desamparados, 1350m. San Jose, Costa Rica
found with some of the other nests. 10:45. No activity
whatsoever thus far. Tree still in shade.
12:00. No activity at all this past three hours. The
hole is just now becoming exposed to the sunlight.

9 August

5 km SE. Desamparados, 1200-1300m, San Jose, Costa Rica
09:15 Took Nest #22. Took three pictures. It was 6ft
off of ground. Opening was on underside of branch.
Branch ran in an E-W direction. Tree is of sp. ST#
Bot #76. Woodpeckers appear to have attempted to enter
nest. The nest tree was at bottom of a slope about
100ft higher in altitude. Nest is of the Neoxylac-
opa and consists of 2♂♂ + 1♀.
10:00. Found Nest #36 (2♂♂ + 1♀) in a fence pole
along the road at the top of the slope where
nest #22 was located. The opening was 40 inches
above the ground for #36. It opened at a 225°.
Took one picture of this nest pole. Could not
determine what ~~tree~~ the nest tree was.

Neoxylacopa →

Nest #22. There were spider webs in the burrow
was between where the woodpecker had made
its entrance. The bees were in only one
part: A + B.



This nest was a simple tube, going out in both

R D Sape
1965.

(30)

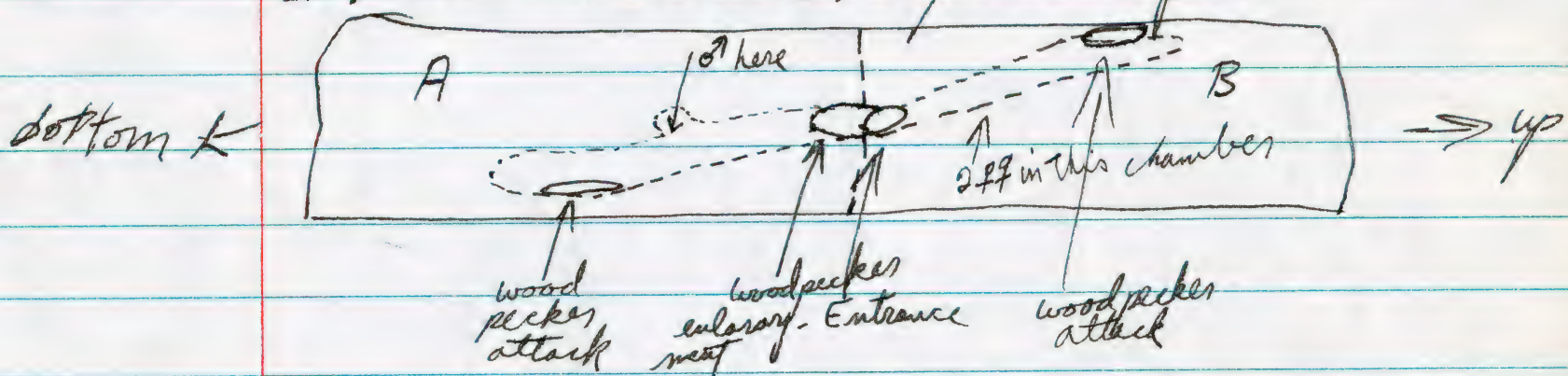
Xylocopa sp

5 km SE. Desamparados, 1200-1300 m., San José, Costa Rica

9 August

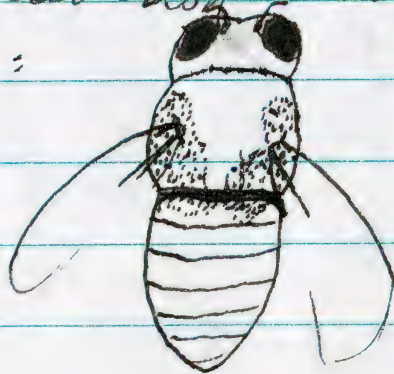
directions from the entrance. Diameter of nest at entrance was 37 mm

Nest #36 Schoenherria. The nest was T-shaped. It had been attacked by a woodpecker.



Diameter of post at this point of the entrance was 47 mm

Pickled the ♂ of this nest as it was covered with mites (?) and the ♀♀ were bare. This phenomenon can be seen in the other Schoenherria we have taken here. The distribution ^{infestation} is heavy & distribution is as follows:



• = mites

The undersides were bare, & the wings also.

There was also a scolypid in the wood of the nest post & it is pickled with the infected bee.

Schoenherria

37. In same post as #36 but up higher--near the tip. Couldn't tell what direction the opening was as I didn't discover it until after I had removed this part of the post from the fence. It consists of 1 ♀ only. She has a sample going up

RD Sage
1965

(31)

Xylocopa sp.

9 August

5 km SE. Desamparados, 1200-1300 m, San Jose, Costa Rica
The port. When I removed the paper I had used as a plug the bee was facing the opening. When I started to probe with a pair of forceps she immediately brought her abdomen around and tried to sting the forceps. There was no provision in the nest. I pickled her. The nest consists of two pieces. Nest diameter at entrance was 42 mm.

The two nests 36 + 37. ~~was~~ were in a fence post along the road which runs along a ridge.

I walked down the west slope of the same ridge in a cow pasture. I followed a fence ~~road~~ in hopes of finding more of these types of nests. I found two abandoned nests in the same type of wood. They had both been attacked - apparently successfully - by woodpeckers. One nest was 15 in off the ground & opened due South. The woodpeckers apparently can detect the course of the burrow and successfully enter near its ends where the bees would be gathered.

10 August

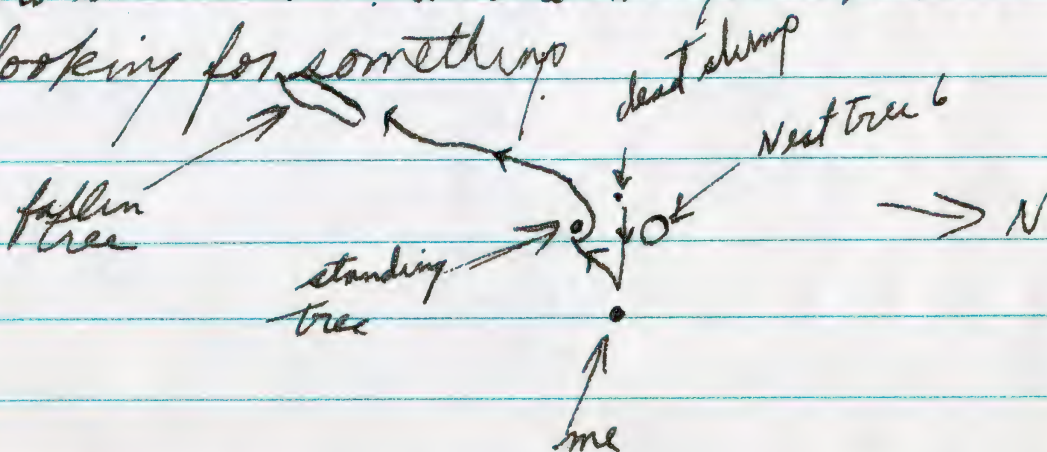
5.5 km SE. Desamparados, 1260 m, San Jose, Costa Rica
08:15. Arrived at Nest #5. Sun is shining except for brief periods when a cloud comes overhead. There ~~was~~ was fresh-looking saw-dust on the entrance to the nest - which goes up into the tree. This nest is different

RD Sage
1965

(32)

Xylocopa sp.

5.5 km SE Desamparados, 1260 m, San Jose, Costa Rica
from the others I have seen lately in that it
opens to a ^{eastward} ~~westward~~ direction (120°). The hillside
at this point has a slope of about $50^\circ-50^\circ$. The
next hole is 56 in off the ground. 10:27
bee came down to the entrance of the hole. Returned
back up the burrow as I am near. It appears to be
Neoxylocopa. 10:50. bee returned to opening of nest. Did
not stick its head out of the opening. 11:00 Bee came out
entrance. At same time collected a ♂ *Neoxylocopa* (Nest #39)
flying about low to the ground. Bee ^{at} nest
stuck ~~ant~~ antennae out for 10 seconds then
disappeared back up the burrow. ♂ was taken
5 ft from nest. I did not see or hear a bee leave
the nest previously. 11:09. ^{another} ♂ *Neoxylocopa* flew
by me at a height of 20". It first stopped at a
small stump lying 5 ft S of base of nest tree #5.
It then flew up with 2 ft of my face then flew
west to base of tree 5 ft from nest tree 6 & landed
for only a second. Then flew SW. towards a fallen
tree. I lost sight of it then. It flew fairly slow &
did appear to be disturbed. I ~~then~~ thought it looked as if
it were looking for something.



RD Sage
1965

(33)

Xylocopa sp.

5.5 km SE. Desamparados, 1260 m, San José, Costa Rica

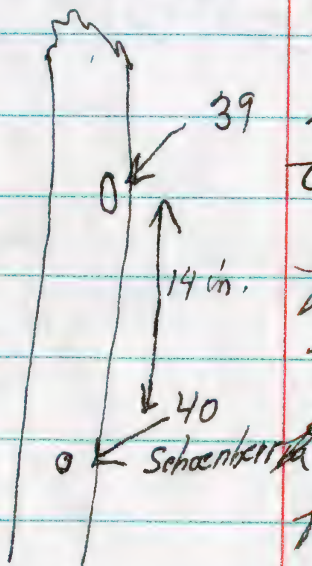
10 August

11:25. Bee visible upon close inspection about 2 inches up the burrow. 11:25 ♂ *Neoxylacopa* flew by. It was flying a little bit higher (3-4 ft) Flew by from the west & then up the hill to the SE.

11:38 bee came to entrance. A small chrysalis flew by entrance at distance 1-2 in & bee immediately withdrew back up burrow.

11:40. Sighted ♀ *Schoenherria* flying about rotting tree 40 ft NE of Nest 6. Located & starting a nest. Watched her for two minutes All of sudden ♀ *Mega* dropped out of unseen burrow 1 ft above. Scared the *Schoenherria* away from nest *Schoenherria* ~~has~~ flew around 2 ft away.

Nest 39



Mega went back to nest. *Schoenherria* returned to tree & buzzed around close to trunk looking for hole site. Finally stopped flying and started to work. again. ♀ *Mega* came out hole flew down within 3 in of *Schoenherria* & then flew back to hole. *Schoenherria* didn't stop work.

This hole the *Schoenherria* started was 5 in below the one at which I first saw her. This first hole didn't ~~me~~ was about 3 mm deep. It looks as if she started 2° hole from start. At three feet you can hear the chewing sound. 11:53 *Schoenherria* still digging. *Schoenherria* oblivious to me at 20 in. work is done with mouth & fore legs seem to pull chips out. Nest is just below

Xylocopa sp

5.5 km SE Desamparados, 1260 m, San Jose, Costa Rica.

10 Aug.

is pine on tree, Bee is holding onto ⁴ spine & dipping upside down. 12:03. Dips deeper as head. 12:06 upside down again. 12:08 Right side up. 12:09 upside down. Is working in a clockwise circle. 12:11 right side up. Is in as deep as it can take a line across wings. 12:12 upside down. Is spending more time upside down. Hanging on to outside by only hind legs. 12:13 right side up. 12:15 upside down. Work does not seem to be done at the horizontal only right & upside down. Her wings are folded tight across her back so that they cross over one another: . 12:17 Right side up. -- moving always clockwise. Wood comes out under belly. 12:19 upside down, working at horizontal 3 o'clock position (12:21). 12:21 right side up. Uses 2 legs for pulling out wood grains. 12:23 right side up. 12:25 upside down (moved counter clockwise) 12:26 right side up (" " ") 12:27 upside down (" " ") chips building up on belly while upside down. Turned to 9 o'clock position & many chips fell out. 12:32 Right side up. Sky clouding over & wind beginning to blow. 12:34 upside down. 12:36 right side up, moving counterclockwise. 12:38 Upside down. Wind blowing stronger. 12:38 right side up. 12:38 upside down. -- very active. Stopped working.

RD Loge
1965

(35)

Xylocopa sp

10 August

5.5 km SE. Desamparados, 1260m, San Jose, Costa Rica.
1240 Came out of hole. Cleared antennae. Flew around tree at 2-3 in distance. Enlarged circumference of flight with each circle. I'm sure it was sight fixation. Then flew away. 12:43. Returned buzzed around main tree once then around vicinity of nest hole and landed 1 in below & crawled up to it & began to dig. 12:45 Upside down moving clockwise. 12:54 Right side up. 12:55 upside down. 12:57 in up to the junction of abdomen & thorax. 13:01 Right side up moving counter clockwise. Went flying again. 13:02 Upside down. This next entrance is at 240°. The *Megaxylocopa* above us at 240°. 13:06 Right side up. 13:07. First raindrops. 13:09 Upside down. Raining now. 13:14. Left the tree with I still digging.

Returned at 15:40. I present only tip of abdomen ~~is~~ showing. Not rainy just cloudy. A large amount of grass hanging around outside of nest entrance. Tried to ~~take~~ take some pictures of the nest & frass but camera is on blink. AT 16:44 all but ~~very~~ small portion of abdomen was hidden from view. 17:30. Alloy bee was out of sight in burrow.

11 August

Returned to nest 39+40. at 08:35 Her face was visible just inside the entrance. I cleared away some branches which were obstructing

RD Loge
1965

(36)

Xylocopa sp.

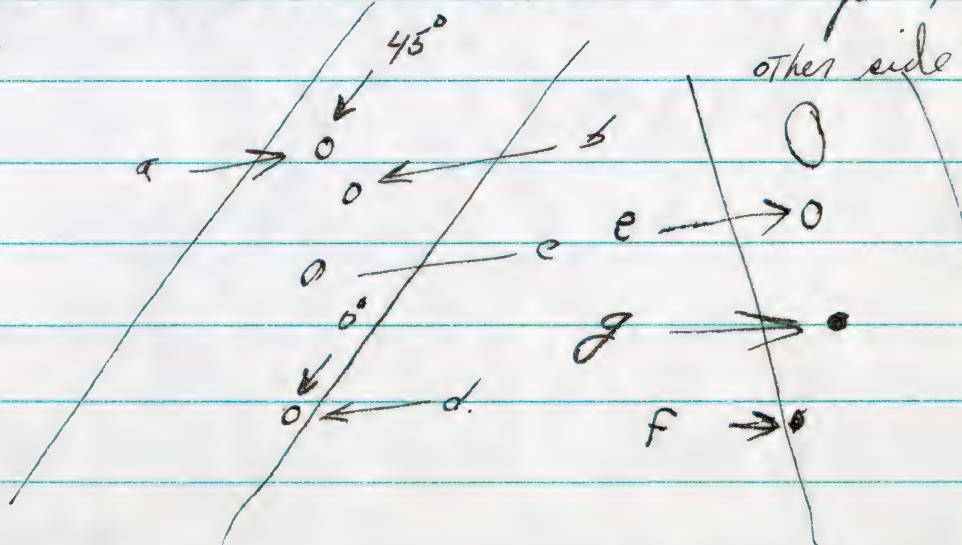
5.5 km SE. Desamparados, 1260m, San Jose, Costa Rica

to view and she retreated up the burrow a little further but her head was still visible. It was cloudy overhead & the wind was blowing. Very little saw dust remains visible outside the nest entrance.
08:47 Backed out of burrow so only head was inside. Her body was covered with small saw dust & gave her a very light colored appearance. 08:51 Came out of burrow and remained quietly at entrance until 09:01. Began a few wing beats. At 09:02 flew off nest tree. circled the tree twice & flew off. Measured the cavity in her absence. It is approx 24mm to the back of it.
09:15 Began to rain. Returned at 09:29. Saw dust gone off her back. Found the entrance with no false starts. Apparently went right back to work.

2.5 km E, 4 km N Chiriquia, 600m, Cartago, Costa Rica

12 August

11:58. Saw large carpenter bee fly from cut tree. it came from ~~the~~ 30 ft up. Circled the area and then disappeared. Sighted 3 nests holes close to one another. Collected a woodpecker off 12:15.



RD Lopez
1965

37

Journal

Trylocopa sp.

2.5 km E., 4 km N, Chiterio, 600m, Cartago Costa Rica

12 August

Abest #	Enter	Leave
b	—	12:15
d	12:15	—
?	—	12:23
?	—	12:28
g	—	—
f g	12:29	12:29
e	12:32	12:33
F	12:48	—
F	12:50	—
g g g	—	12:52
g	12:58	—
b	15:45	—

Lightlela bee entering a hole at 15:45.

13 August.

Arrived about 09:00. Bees were active at nest. Began to rain at 09:45.

Climbed up in tree at 10:15 and plugged up the burrow entrances. Began to saw the tree down, it took 45 min. Took the tree & left for denjose.

14 August

1 ♀ from nest &
N g 1 ♀
N * 1 ♀
N 1 1 ♀

R.D. Sapl
1965

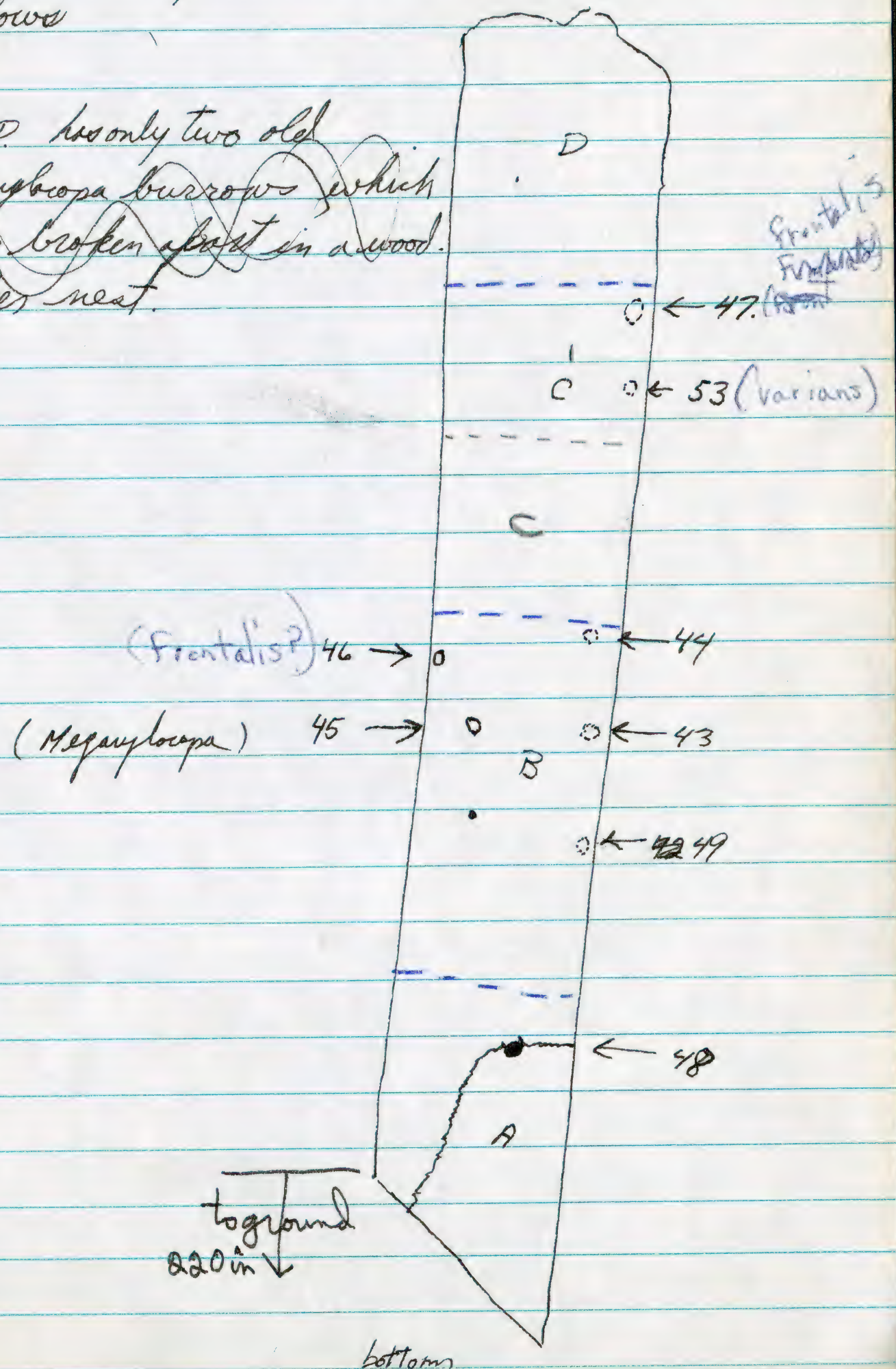
xylocopa sp.

2.5 km E., 4 km N. Chitania, 600m, Cartago, Costa Rica

14 August

Nest log is 9-10 in diameter and about 46 in. in length. Sawed into 4 pieces as follows

Part D has only two old *Megaxylocopa* burrows which were broken apart in a wood pecker's nest.



RD. Sagar
1965

(39)

Xylocopa sp.

14 August

2.5 km E., 4 km N. Chitara, 600 m, Cartago, Costa Rica

Nest 48

) ~~At~~ Entrance is at 0°

Burrow slants upwards and splits into 3 chambers. This is bottom nest on the log. The nest entrance is right on a crack in the log.

Megaxylocopa

♀ left first. Took a (♂ ♀?) from center chamber

⁴⁹
Nest ~~48~~

Entrance at 315°. Is 9 in up the log from Nest 48. Slopes upwards

Nest 43. Entrance at 270°. 5 inches ^{up} from Nest 48.

Nest 44. Entrance at 270°. 3.5 inches ^{up} from Nest 43.

Nest 45. Entrance at 15°. 8.5 in around circumference from Nest 43. Took 1♂, 1♀
(*Megaxylocopa*) 1♂, 7♀♀

R.D. Sage
1965

(40)

Xylocopa sp.

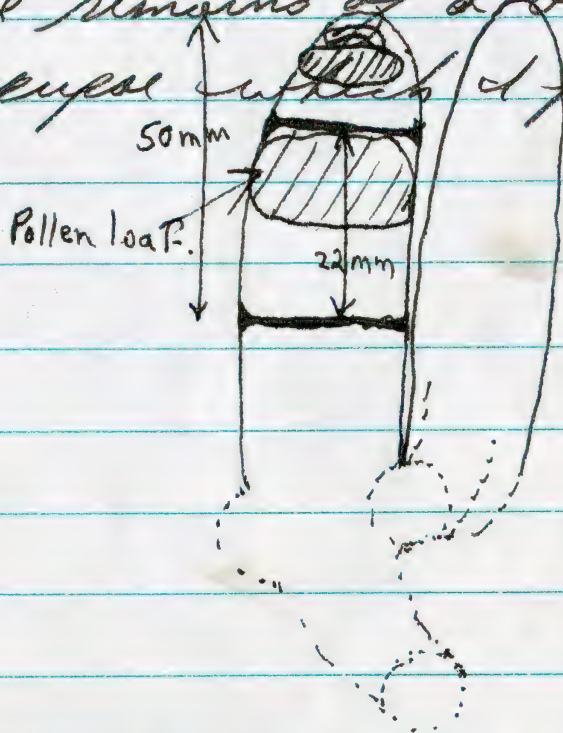
2.5 km E., 4 km N. Chitara, 600 m, ^{Cartago.} ~~Costa Rica~~ Costa Rica

14 August Nest 46. At 30°. 3.5 m. from Nest 45.

Megaxylocopa

Nest 47. Entrance at 270°. It is 14 in up the tree from Nest 44. The entrance has been attacked by woodpeckers. The burrow forks 3 inches in from entrance. The fork which is outermost has been entered by wood pecker 4 inches up from bifurcation. The more central nest contains a live bee. Took 1 ♀. in the inner burrow.

46 cont. Complicated nest. Contained one burrow with two cells with larvae and pollen loaves. The adjacent ~~se~~ burrow had the remains of a orthoptera in it and a pupae which I partially damaged.



The chambers were sealed with a compressed sand dust material which in the top chamber was 4 mm thick in the middle

R.D. Sape
1968

(41)

Xylocopa sp.

2.5 km. E., 4 km N Chitara, 600m, Cartago, Costa Rica

14 August.

Nest 46 cont. The top chamber contained a larva & pollen loaf about $\frac{1}{2}$ the size of the one in the outermost cell. Here I couldn't see any larva or an egg but it may be discovered inside the loaf. The loaf itself is a very gooey stuff with a consistency like raw cookie dough. The chamber in which the orthopteroid was has its walls a dark gray color -- presumably fungi. The other burrows are the natural color of the wood. The pollen balls are attached at top of chamber.

Nest 53. A. Schoenherria ♀. Entrance at 270°

The burrow is 5 inches below Nest 47. The burrow is similar to the Schoenherria nest I got at Sanidro in that it points up for a short distance & then drops down -- not at all like the megacylocopa.

The ~~nest~~ pieces of the nests are numbered & pieced together:

Section	Nest #	# of pieces
D.	47.	2
C'	47 entrance, 53	1
C	45, 46 & 53 parts.	2.
B.	43, 45, 46, 49, 48 part.	4.
A	48 entrance	1

RD. Sage
1965

(42)

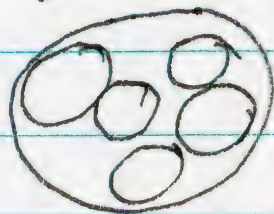
Xylocopa sp.

14 August

2.5 km E, 4 km N, Chiteria, 600 m, Cartago, Costa Rica

In a sealed off burrow in Nest 45 there were two cells containing what I presume are wasps. The burrow had about 10 of these grass cocoons. There were 4-5 in each cell:

They all appeared to be dead & dried up. Pickled the mass.



15 August

Liberia, Guanacaste, Costa Rica

15:00. Checked out an abandoned barn and corral on the east side of town. There were many nest entrances in the crossbeams of the structure. They had all been painted with tar from what I could understand from a peon who guards the place. In some of them I saw the mud chambers of wasps. In the corral we found four active nests, 1 in one timber & 3 in another. On the way out found another nest with active sawdust but the bee was not in.

15 Aug.

14 km SW. Liberia, Guanacaste, Costa Rica

15:30. Found *Xylocopa* visiting a mimosa-like legume which was in flower on both sides of the road in the fields. The bees were scattered about 1 to very 7 bushes. *Bombus* was working the same flowers.

R.D. Sage
1965

43

Xylocopa sp. ~~found~~

Playas del Coco, sea level, Guanacaste, Costa Rica

16 August

11:00 - 12:00 - In a fence row 35 yds in from the beach and extending about 40 yds inland I found the abandoned nest of either *Megar* or *Neoxylocopa*. Found another burrow which was started but only extended about 1 in. into the wood. Another nest was found in a post which looks like it is active although I was unable to get a response to probing. The nest angled up and then dropped down the post.

15:30. Found a nest in the end of a root of a large tree which had toppled over into the lagoon.

17 August

06:00 - 05:30 - 06:15. Checked the patch of *Solanum* near the cow pasture that has the *Crotalaria* in it. Most of it had gone to fruit and I saw no bees. Moved over to the patch behind the motel -- which Steve had watched before -- again no *Xylocopa*. I watched the white *Scaphularia* that is in flower adjacent to the *Solanum*. Saw only *Euplora* and *Centris* on it.

17:10. Checked the *Crotalaria* patch I watched before and found only one *Neoxylocopa* on the stuff in

19 August

08:50. Found a dead tree forming part of a fence row which has at least 7 nest entrances -- only one of which could be determined as being active. 09:00 While waiting this a large black bee returned

R. D. Slay

1965

Xylocopa sp

19 August

Playas del Coco, sea level, Guanacaste, Costa Rica

and went into this same burrow ^(Nest a) as I had already determined as having a bee. I couldn't make out at a distance of 12-15 ft. whether this bee had pollen on its scopae -- it didn't look so. 09:09. Another large bee (Mega I think) returned to another entrance (Nest b)

Nest b bee returned to front of nest & extended her antennae but went back in. Could be an disturbing her sitting 6 ft away. Left at 09:30 when neither bee had emerged.

14 km W. Liberia via Hwy 21, Guanacaste, Costa Rica

20 August

09:45 Found Nest 55 in dead branch of

SJA Bot # 83. The nest entrance was on the underside of branch & branch was running in a N-S direction. I broke off the branch exposing the burrow & found one bee in the basal portion. Plugged this. While waiting account 2 more ^{♀♀} emerged & escaped from the more distal hole. The branch was on S side of bush & 4 ft off the ground. There are two other nest holes in same piece of branch.

Upon examination in a room it was discovered that there were 2 nest entrances for this nest. The nest yielded 3 ♀♀ and 2 ♂♂. (plus 2 ♀♀ which escaped. The diameter of the nest ~~tree~~

RDSage
1965

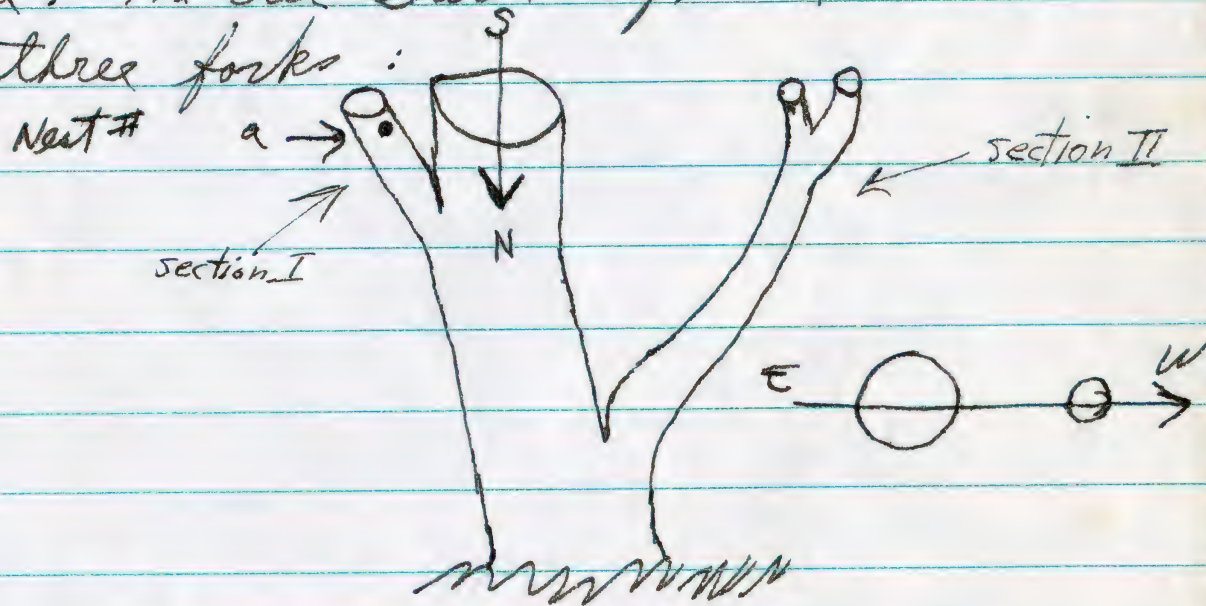
(45)

Xylocopa sp.

20 August 14 km SW Liberia, via Hwy 21, Guanacaste, Costa Rica
branch is 35 mm. The 5 bees were in the most
lax section of the branch. The two which
escaped were from the more distal portion.

20 August Playas del Coco, sea level, Guanacaste, Costa Rica
16:10. Checked the *Crotalaria* and found 2 *Neor-*
xylocopa visiting them. Plugged the holes
in the tree I found yesterday at 17:30.

21 August 07:45. Cut off the branches of the tree
containing the bees nests. Took two pictures of
the area. The tree stood 5 ft tall with
three three forks:



In the main trunk there were no nests. In the
smaller one there was one at the top of the branch.
It opened in a NW direction.

Nest #59

Contained 2 ♀♀ *Neoxylocopa*. NW. opening
for entrance. Simple J-shaped burrow
slanting upward. 80 mm in length. branch had diameter of 120 mm.

RD. Luge
1965

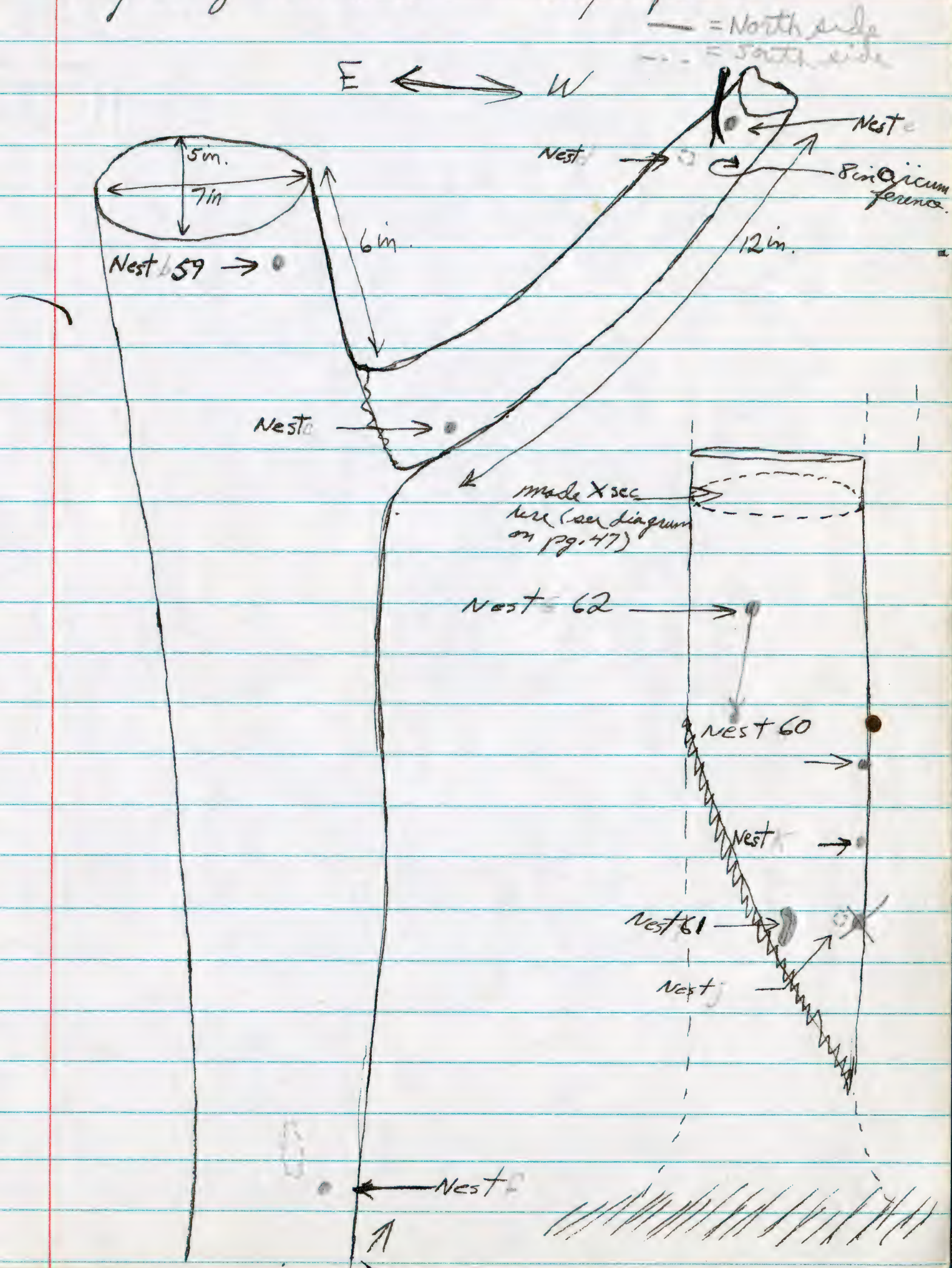
46

Xylocopa sp.

Playas del Coco, sea level, Guanacaste, Costa Rica

21 August

Diagram of Section II Looking in from N.



R.D. Sage
1965

(47)

Xylocopa sp.

Playas del Coco, sea level, Guanacaste, Costa Rica

21 August

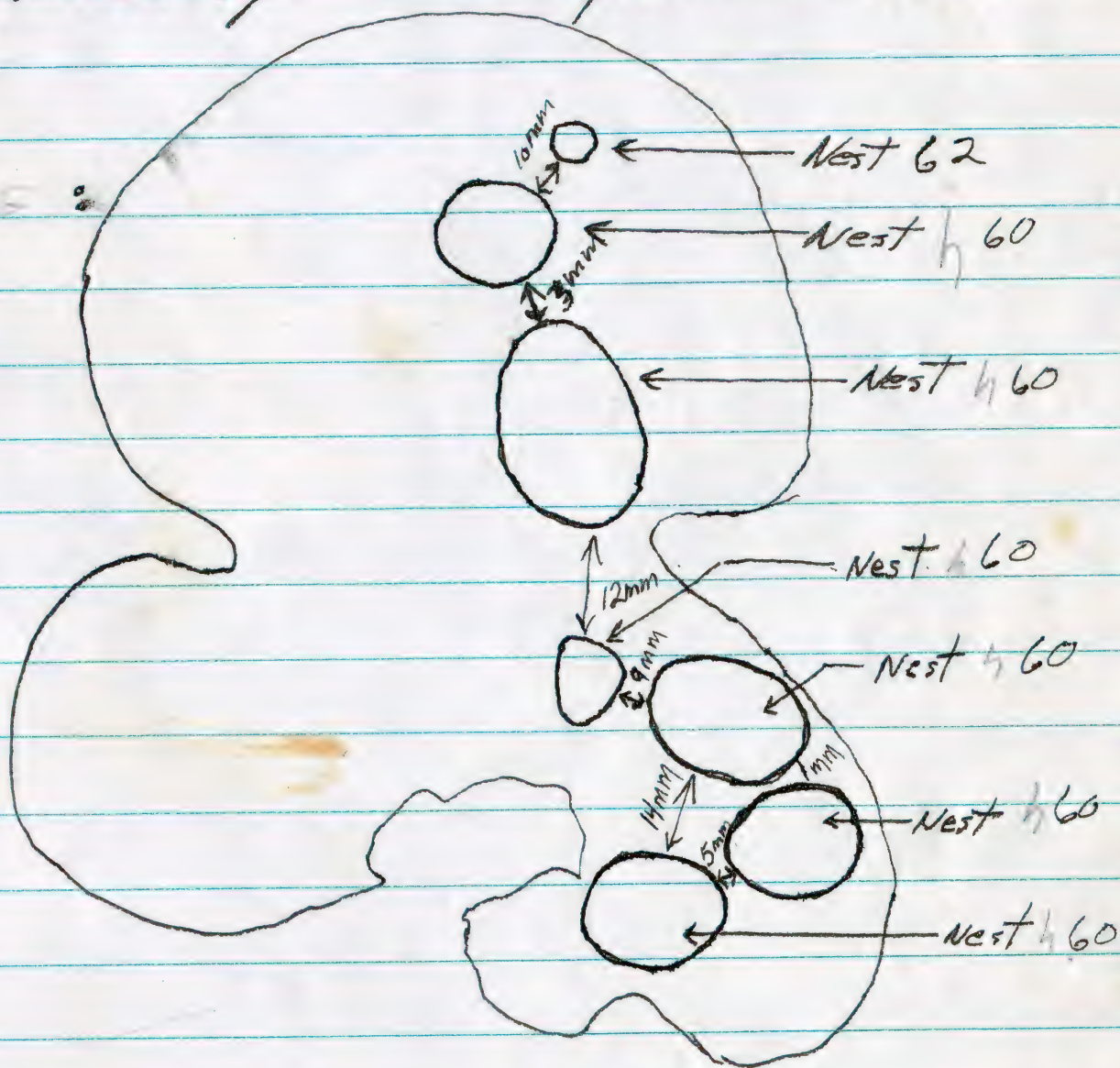
Nest # a 59, *Neoxylocopa*, 3 in from top.

Entrance at N. Entrance ~~partly~~ partially obscured by a small dead twig

Nests c, d, & e are all abandoned. Nest c & e are *Schoenherria* size. The other is a short *Neoxylocopa* hole size. Nest c looked very recent.

Nest b. an opening to the N. An abandoned but very complex *Neo* or *Megaxylocopa* burrow. It started up. Must be from last season.

X sec. of log
between Nest



R.D. Sage
1965

(48)

Mylocopa sp

21 August

Playas del Coco, sea level, Guanacaste, Costa Rica
Nest # 60, *Megabylocopa*, opening
at W. Angles upwards. Very complicated. At
point breaks through to Nest F which is
abandoned. Found 5 ♂♂ & 6 ♀♀ in this nest.

Nest 62, *Schoenherria subvirescens*, opening
at NW. Angles upwards from entrance.
Took 5 ♀♀, 12 ♂♂, 1? . Pickled 1 ♂ & 1 ♀ plus abdomen of
one I chopped in half while opening the top.

Nest 61, *Megabylocopa*, opening
to the NW. Angled upwards & then branched
into three columns. Contained 2 ♀♀ 4 ♂♂.

2 ♂♂ were in one cell & the other 4 were
in another one of the cells together. This
is the same nest into which I saw a ♀
fly yesterday (see sp. count).

When these bees were pulled from the
nest and crowded into cyanide jars they
exuded a sticky fluid from their anus.
It has a smell of vanilla -- or fresh sawdust.

Liberia, Guanacaste, Costa Rica

22 August 11:00. Returned to the barn where we
found the other nests. I counted 36 nest
entrances in the rafters of the barn
itself. They had been painted with
a black material -- no doubt tar.

R.D. Soper
1965

(49)

Xylocopa sp

22 August

Liberia, Guanacaste, Costa Rica
Talked with the owner of the place. He said the paint they use is called Alkyron. It covers the wings of the bees when they leave & they fall to the ground where they stomp on them.

25 August

5.5 km SE Desamparados, 1260 m, San Jose, Costa Rica
Nest # 21. In a fallen tree in open meadow. Took 1 picture of nest. Opening of nest is at 65° . Height from ground is 3 ft. Another 3 ft of branch goes up from there. Burrow slopes upwards in branch. (Schoenherria) 8♂♂ 3♀♀.

Picked 1 ♀ + 1 ♂ which were damaged in opening the nest.

There ~~was~~ was a light infestation of mites on 4 of the ♂♂. Absolutely none on the 2♀♀. The mites were at the base of the right wing on one & in between the abdomen and thorax on the others. The diameter at nest entrance is 70 mm.

Nests 74 & 75 were located in a dead tree (SJR Bot #76.) The tree was one of three of the same species -- all dead at the very head of the lower meadow. The slope it was on faced NE. The tree itself stood 15-18 ft high. The branch in which the nests were located was a side branch from the main trunk. The woodpeckers had attacked the tree and hollowed out a cavity with an opening 55 x 75 mm. From the lower lip of the entrance the cavity is 80 mm deep.

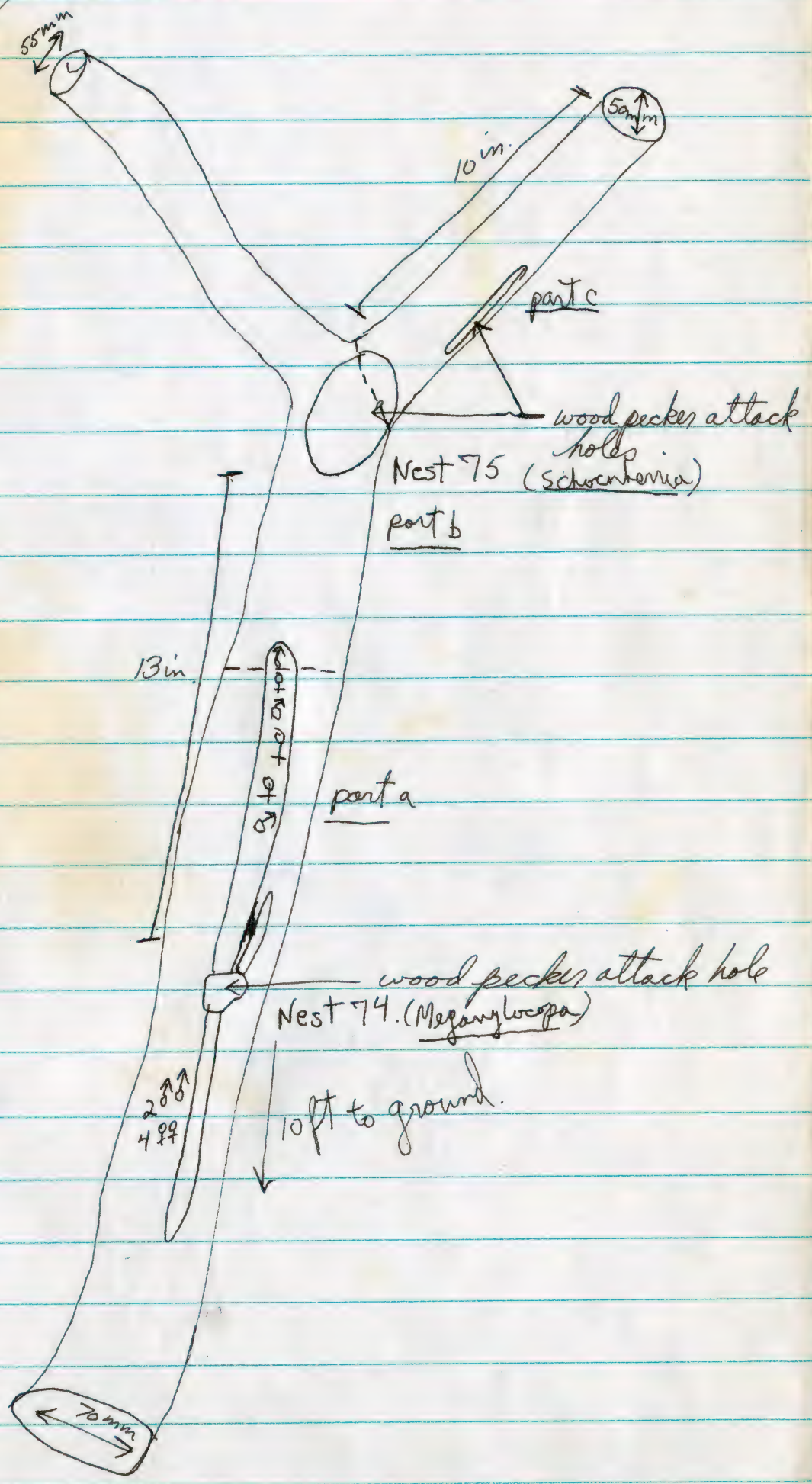
RD. Sage
1965

Xylocopa sp

5.5 km SE. Desamparados, 1260 m, San Jose, Costa Rica

25 August

Going up the cavity follows the burrows of the *Xylocopa* burrow.



RD. Sage
1965

(51)

Xylocopa sp

25 August

5.5 km SE. Desamparados, 1260 m, San José, Costa Rica

The woodpeckers destroyed the entrances to
along the burrows. The cavity opened in a
S.E. direction when the tree was standing.
The ~~last~~ lowest nest # 74 was 10 ft above
the ground.

Nest 74 *Megarylocopa* 5 ♂♂ 7 ♀♀. Entrance destroyed
by woodpecker attack. Entrance 10 ft above
ground. Picked 1 ♂ & 1 ♀.

Nest 75 *Schoenherria* 708. Entrance &
part of nest destroyed by woodpecker. These bees
do not have any mites on them.

26 August

13:45. Checked Nests 39 & 40 with a piece of
grass and found a bee in each one.

14:25. Found Nests 77 & 78 in a spiny
bush (SJA Bot #76). The lower third of the
tree was still living. - The upper 2/3 was
dead. The Nest 77 opened up 300° and
30 in. above the ground. Began to rain.
The slope faced NW. These nests were
40 ft S of Nest 7.

Nest 7476 in *Malvotomacra* - dead. It
stands 12 ft high. Nest 7 has entrance at
120°. & is 7 ft above ground in fork of branch.
Nest ~~76~~²². 105° is the entrance and 5 ft above the ground.

The nest is in a spiny tree (SJA Bot #76) Nest slopes
upwards in the branch.

R.D. Sage
1965

52

Xylocopa sp.

5.5 km SE Desamparados, 1260 m, San Jose, Costa Rica

26 August

Nest #62. *Neoxylocopa* 3♀♀ Diameter of limb at nest entrance 60 mm. Circumference of tree at base is 14 inches.

Nest 76 *Schoenherria* 4♀♀, 2♂♂, ^(see p. 51) Entrance at 120° on the slope side of the branch. Burrow slopes upwards in branch. 1 bee escaped in the field while sawing it apart. Mites infesting the 2♂♂, none on ♀♀.

Nest 7 *Schoenherria* 4♀♀ 3♂♂. Entrance at 120° in crotch of a branch. Hole was 7 ft above ground on a N facing slope. There was one end cell which had apparently died. There was the remains of the cell end around the edges of the burrow. Inside this cell there was a black moldy mass. ^{The cell was 16 mm in length.} No mites on these bees.

Nest 77 *Schoenherria* 2♂♂. (see pp. 51 for description of tree & openings. Mites on 1♂ on the first tergite.

Nest 78 *Neoxylocopa* 2♀♀ Pickled both.

There were wood ants nesting in an abandoned *Xylocopa* in the same portion of the tree with the 2 live nests. Pickled some of these. There were termites boring through the center of the log. Pickled some of these also.

29 August

10:55 Sat down to watch Nests 39 & 40. Nest 40 is incredibly camouflaged. Even now I have to check with a close up examination to determine its exact position. 12:15 No activity at all during the past hour & fifteen minutes. Now the sky is now cloudy overhead.

RD. Sage

1965

Xylocopa sp.

53

29 August

5.5 km SE. Desamparados, 1260 m, San Jose, Costa Rica

15:15. Plugged up the entrances and sawed down
Nests 39 & 40. Took black & white photographs of them
earlier. There was more sawdust below the entrance to
Nest 40.

Schoenherria 6♀♀ + 4♂♂
Nest 4. Entrance at 320° , 15 in above ground.
Stump is unidentified tree and is 21 in high.
Circumference at ^{entrance} base is 21 inches. No mention of the bees.

Neoxylocopa 3♂♂, 7♀♀
Nest 79. Entrance at 300° , 8.5 in above ground
in unidentified dead stump 17 in tall.

Circumference at height of nest is 12 in.

Neoxylocopa 1♀
Nest 80. Entrance at 225° , 6 in above ground
in unidentified dead stump. Stump is 13 in
high. Circumference at nest height is 17 in. There
is another entrance hole at 345° , 7 in above the ground.
The active burrow has been exposed at the top
where part of the stump has been broken off. I
plugged this entrance at 12:00. Took a picture of this
stump in black and white.

Collected a dead branch from the
Melastomaceae tree which had nest entrances
in it and wood pecker damage. The lowest
nest on the post has its entrance at 0° and
is $7\frac{1}{2}$ ft off the ground. <sup>was abandoned but contained
some bee provisioning of
ingulinate</sup>

Nest 81. Entrance at 195° approximately 11 ft
above ground in a branch of a completely
dead *Melastomaceae*. Took black & white
pictures of wood pecker damage to this nest.

Dick: I've also got a
nest #81

RD. Sage
1965

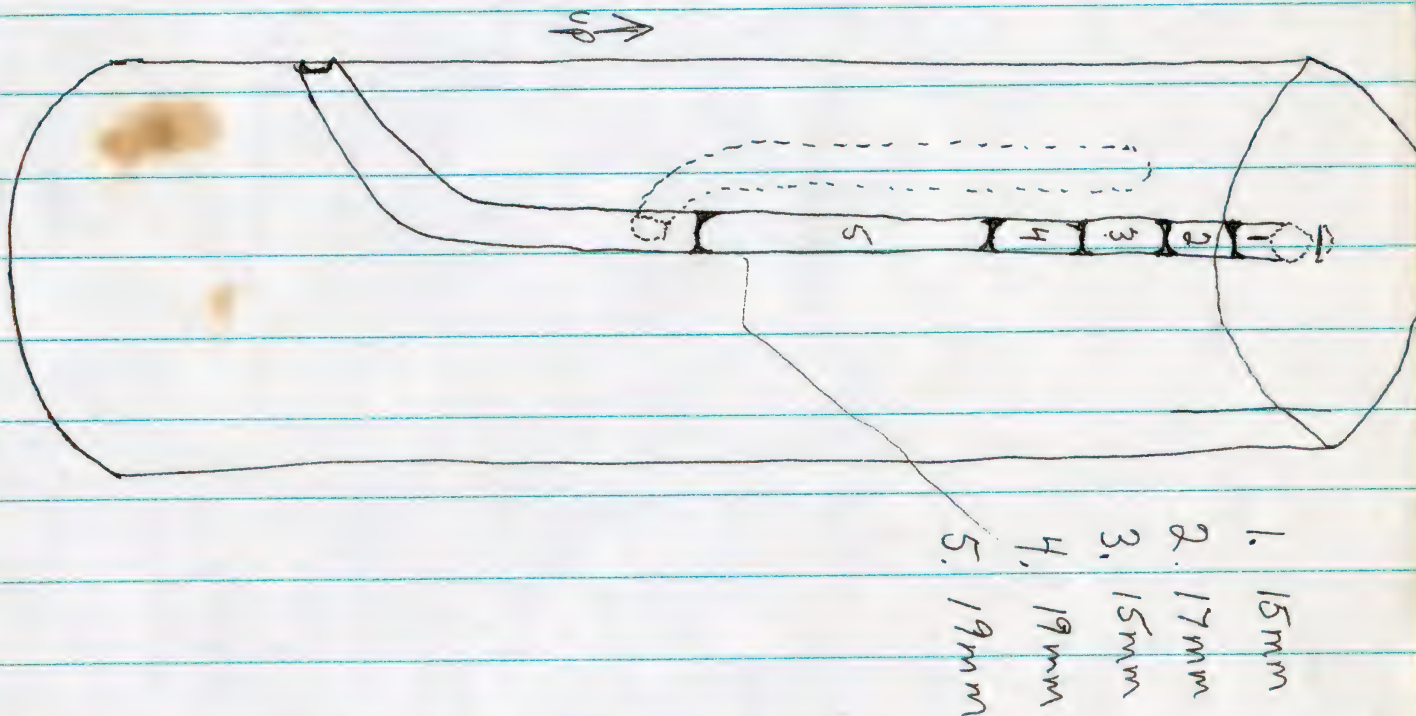
54

Xylocopa sp.

29 August

5.5 km SE. D. Examparados, 1260 m, San Jose, Costa Rica

Nest 81 cont. It appears to be abandoned here in the field. Upon examination at home it proved to be empty. Apparently the woodpecker must have taken the bees before they hatched as the remains of the cell walls are still present -- in various stages of decay. In this attacked ~~channel~~ channel there are the remains of 5 cells. The nest is as follows:



The unattacked channel is empty. This is almost surely an old *Schoenherria* nest. The end of the attacked channel is right at the saw cut and was not saved.

Upon breaking open #6, a former *tabaniformis* nest I ~~had~~ found it to be abandoned and occupied by a mud nest hymenoptera. Even these though are old with nothing in them.

RD. Sage
1965

(55)

Xylocopa sp.

5.5 km SE. Desamparados, 1260 m, San Jose, Costa Rica
Nest 39 *Neoxylocopa* 2♀♀. Entrance at 210°
approximately 3 ft above ground in dead STA Bot
76. Pickled both bees.

Nest 40 *Schoenherria* 1♀ in same branch
as 39 (see earlier account). Entrance is at 240°, 14 in.
below #39. Pickled the bee. The diameter of
the branch in which these two nests are located is
50-55 mm. At this time this nest is a simple
L-shape, sloping up the trunk of the tree 35 mm.

Santa Rita, 10 mi E Nahuala 7100 ft, Solola Guatemala

35 September 09:20-10:00. At 09:20 Collected 1 specimen on
STA Bot 108. It was collecting nectar apparently, as no pollen
could be seen on the flower. Also the flowers were very
small and as can be seen from the specimen the most
of it had gone to seed. The other specimen was taken at
10:00 on STA Bot 111. It is a legume which had first attracted
me to the area. The site was in a corner of a fenced in
orchard. Many weeds & herbaceous things growing there.
The two plants, STA Bot 108 & 111 were growing in the
same corner & closely intertwined with one another. I saw
only one other *Neoxylocopa* on STA Bot 108 but missed
collecting it. The one I got at 10:00 on Bot #111 was collecting
pollen. It moved very rapidly from flower to flower -
very different from *Neoxylocopa*.

collected in
San Antonio.
collected on

RD. Lopez
1965

(56)

Xylocopa sp.

3 Sept.

Huehuetenango 6200ft, Huehuetenango Guatemala
15:45-16:30. Collected 2 *Neoxylocopa* and 1 ♂
~~*Schoenherria*~~ ^{*Neoxylocopa*} sp. off of STA Bot 112. The first
site of collection was along a NE facing slope
in a natives front yd. There were 5 major trees
on which staves & I got *Neoxylocopa*. Collected
Bombus on the same stuff. In towards
town where the road crosses a deep gully
with a stream running through it. There were
many of these same trees growing. Collected
1 more ♀ *Neoxylocopa*. Apparently both of the
Neoxylocopa were taking nectar as their scopes are
clean but they were visiting the flowers. The
♂ *Schoenherria* was hovering at eye level
under the outside branches of the same tree.
Another ♂ of the same sp. chased a *Bombus*
which entered into a similar zone on another
bush. This bee returned to the same position
it was holding before the *Bombus* had arrived.

4 Sept.

06:45 Returned to the river bank site. Collected 1 ♀
Neoxylocopa on a blue stemmed flower (STA Bot
113) There was a *Bombus* on the same bush.
This bush was the only one in the patch of
corn & squash. 07:00 Followed 1 *Neoxylocopa* (♂?)
as it circled a bush of the yellow flowers. It
landed on the top of a flower & walked towards
its base. I counted the time as 4 seconds for
four different flowers. It moved from one flower to

RD. Lopez
1965

57

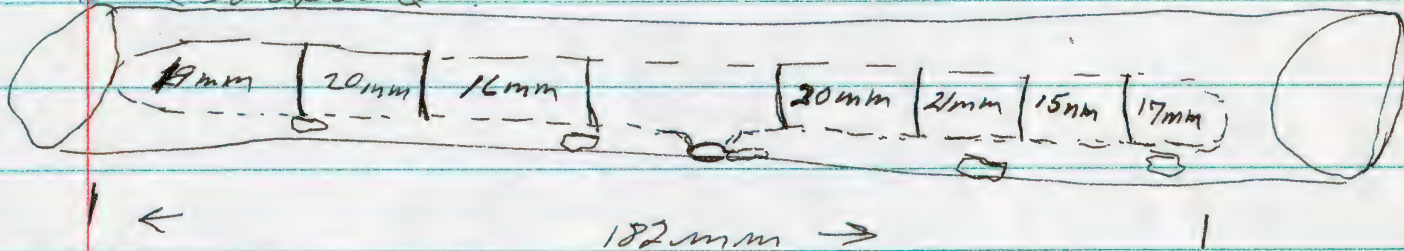
Xylocopa sp.

4 Sept 1965

Huehuetenango, 4200 ft, Huehuetenango, Guatemala
one adjacent or only two or three flowers away
Didn't catch it. 07:10 Took another ♀ Notopygocopa
on the purple flower. Droppae were clean.

34 miles E. Nochi X Tlan, Via Hwy 190 7100 ft. Cavaca, Mexico
07:30 - 09:10. Located 12 abandoned Xylocopa
nests in dead branches of pine trees (STABot #117)
All but one of the nests ^{it was} in lateral branches
up to about eye height. One nest ~~one~~ was in a
small sapling which had been killed. It ~~open~~
This nest opened to the west. The other nests
opened to the underside of the branch. One
tree containing Nest 85 had two other nests
in another branch at about the same height.
Both of these nests had been attacked by woodpecker.

Nest 85. On a lateral branch 4 ft above
ground. Opening was on underside. It had
been destroyed by a woodpecker. 7 recent cells
are visible STABot 117



Saw one Notopygocopa fly by at 08:10. Heard
what were most certainly the same sp. twice
more before 09:00. The area we found
the nests in a pine oak forest on a west
facing slope. The site is near the top of a ridge

RD. Saye
1968

(58)

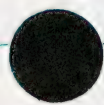
Xylocopa sp

34 mi SSE Aochi, Itzan via Hwy 190,

7100 ft., Oaxaca, Mexico

7 Sept.

All the nests I found which were intact consisted of
a  shaped chamber.



Species Seen

Species Seen

R.D. Sage
1964

Species seen

3 mi E., 1/2 mi S. Canyon, Riverside co., Calif

June 12 Leptotyphlops humilis #170 Costa Hummingbird (10+)
Gerrhonotus multicarinatus (1) Brewer's Wren (3)
Bufo sp. (1) * Warbling Vireo (1)
Sylvilagus auduboni (4+) Foghorn Shrike (1)
Lepus californicus (1) * Scott Oriole (1)
Gambel Quail (FC)
Ash-Throated Flycatcher (1)
Cactus Wren (2)
* Crisal Thrasher (1)

Wilcox Rd, 7 mi E Tucson, Pima co., Arizona

June 13 Morning Dove (C)* Curve-Billed Thrasher Gambel Quail,
0600-0905 * Verdin (4), Black-Tailed Gnatcatcher, * Rufous-Winged
Sparrow, (7)* Ladder-Backed-Woodpecker (2),
Sylvilagus auduboni (1), Cow-Bird (4),
Lesser-Nighthawk (1), * Ash-Throated Fly-
catcher (1), * Lucy Warbler, * Warbling Vireo (2)
1 mi NW. jct Tanager Verde on Catalina Hwy, Pima Co.
Arizona

1900-20:00 Phrynosoma solare (1), Lepus californicus (1), Sylvilagus
auduboni (2), * Purple Martin (2), Roadrunner (1), * Curve-Billed
Thrasher (2), * Gila Wood-Pecker (2).

June 14 Molino Basin, Pima co. Arizona

06:00-0930 Urosaurus ornatus (1) Sceloporus sp (1),
* Bell Vireo (2), Ladder * Acorn Woodpecker, Bush-Tut, (FC)
* Hooded Oriole, Bronze-Cowbird, * Crisal
Thrasher, (1) * Hepatic Tanager (2), * Black-Chinned Humm-

R.D. Seft
1964

Species seen

June 14

Ring Bird (2) * Brood-Billed Hummingbird (1)
Brown Towhee (1), * Desert-Sparrow (1),
Rufous Crowned Sparrow (2), * Arizona
Jay (4) * Cassin's Kingbird (1) * Olivaceous Flycatcher (2)
Black Phoebe (2)

Perm E. Mt. Davis Jct., Jeff Davis co., 3900', Texas

June 16, 1964

** Scaled Quail, Mocking Bird, Desert Sparrow,
* Cassin's Sparrow,

Davis Mt. Jct., Reeves co. Texas

June 16, 1964

* Say's Phoebe, (sitting on nest under gas station)

Mertzon, Irion co. Texas

16 June 1964

* Scissor-Tailed Flycatcher

Perm S. ~~Perm S.~~ Waco, Texas

16 June 1964

* Cardinal (1), * Blue Jay (1)

Ratchief Lake, Texas

17 June 1964

Cardinal (4), Blue Jay (5), * Crested Flycatcher

R.D. Sage
1964

Species Seen

Boykin Springs, Angelina National Forest,
Tasler co June 17 - June 23, 1964

Sharpe Shinned Hawk 1	Blue Jay, F.C.
Turkey Vulture 2	Common Crow F.C.
Bob-White 2	Chickadee
Mourning Dove 1	Tufted Titmouse F.C.
Common Nighthawk 2	* Brown-Headed Nuthatch 10+
* Yellow-Bellied Cuckoo 2	* Carolina Wren F.C., yg
* Red Bellied Woodpecker	Bewick Wren
Downey Wood pecker	* Blue-Gray Gnatcatcher yg
* Red Cockaded Woodpecker	Hermit Thrush (heard)
* E. Wood Pewee	* Red Eyed Vireo F.C.
* Crested Flycatcher	White-Eyed Vireo F.C.
Purple Martin 4	Black & White Warbler 1
* Summer Tanagers	Hooded Warbler 10+
Cardinal	Pine Warbler C.
* Empidonax 1	Pine-Wood Sparrow C. Fl. ^{egg}
Belted Kingfisher 1	Yellow Throated Vireo 1
	Killdeer 4.

R.D. Sage
1964

12 mi SW. Refugio, Refugio co. Texas
25 June 1964 to.

Turkey Vulture	Cardinal 2, 22
* Laughing Gull 1, 1	Pyrrhuloxia 4,
Mourning Dove 1	* Painted Bunting, 2,
* Ground Dove 2,	* Cassin Sparrow, 8,
Nighthawk. 30, 4, 2	* Yellow Billed Cuckoo, 4 ^{egg}
* Golden-Fronted Woodpecker, 6, 3, 2 ^{Y.F.}	Road Runner, 4 ^{egg}
* Weeds Flycatcher 2.	* Bell Vireo, 2, 3 ^{egg}
Scissor-tailed Flycatcher 2, 5	Verdin, 2
Eastern Meadowlark, 3, 3	Desert Sparrow, 1
* ^{Bullock} Bullock Oriole, 2 ^{Y.F.}	* Orchard Oriole, 1
Cnemidophorus ^{Sacki.} ignis , 1	Brown Headed cowbird F.C.
* Elaphe obsoleta, 1	E. Meadowlark c
Crotalus atrox, 1	
Odocoileus virginianus 3	

RP. Sagg
1964

Welder Wildlife Refuge, San Patricio co. Texas

26 June 1964 To 5 July

* Green Heron 1	* Golden Fronted Woodpecker 6, 1
* Mottled Duck 1	Scissor Tailed Flycatcher
Turkey Vulture, 4	Myiarchus
Black Vulture 1	3 Bewick Wren
Red Tailed Hawk 5	E. Mockingbird c.
White Tailed Hawk 1	White-eyed Vireo 3
Bob White 10	Bell Vireo, 2
Turkey c	House Finch fc
Killdeer	Boat-Tailed Grackle
' Laughing Gull	Brown Headed Cowbird
Mourning Dove	E. Meadowlark
Ground Dove, 2	B. Cardinal, c
Yellow Bellied Cuckoo fc.	Pyrrhuloxia, 5
Roadrunner 2 ^{sp}	* Blue Grosbeak 2
Owl	Painted Bunting c ^{sp}
* Parakeet 6	* Lark Sparrow AN. c
Nighthawk, 2	* Cassin Sparrow AN. c
Hummingbird 1	
Bofo woodhousei 3,	Crotalus atrox 1
Terrepenne ornata 1	Black-Tailed Jack Rabbit 2, 1
Gopherus berlandieri, 3	Brush Cotton Tail 4, c
Kinosternon 2	Whitetail Deer. c
Pseudemys	Tavelina 4
Cnemidophorus sackii ^{sp}	Sceloporus variabilis 3
Opheodrys vernalis	Sceloporus sp. 1
	Pituophis m. sayi 1

R.D. Sage
1964

Indian Point Pier, Corpus Christi, 5, Texas

2 July 1964

Blue Heron 1

Willet 10

Least Tern c.

Laughing Gull abundant

Boat-Tailed Grackle 10+

R.D. Sage
1964

Lake Atascosa Wildlife Refuge, Cameron co. Texas.

6 July 1964 -

- | | |
|-------------------------------|---|
| * white Pelican 20+ | Laying Gull C. |
| * white Ibis 6 | * Forster Tern 2 |
| * Little Blue Heron, imm | * Common Tern |
| * Reddish Egret 1 | * Black Tern 1 |
| * Louisiana Heron 5 | Least Tern C |
| * Black-bellied Tree Duck, 5 | * Royal Tern C |
| * Fulvous Tree Duck, 1 | Black Skimmer C |
| Mottled Ducks 7 | Mourning Dove A |
| American Widgeon 1 | Ground Dove C |
| Turkey Vulture 3 | Yellow Billed Cuckoo 2, 2 |
| * Harris Hawk 5 | Roadrunner 1, 1 |
| Caracara 1 | Great Horned Owl 3 |
| Chachalaca ^{heard} 1 | Common Nighthawk C |
| American Coot C. | Parakee, ^{Heard} 1, |
| Killdeer 2 | Ladder Back Woodpecker 1 |
| * Wilson Plover A. | Golden Fronted W.P. C |
| * Long Billed Curlew A. | Scissor Tailed Flycatcher C ^{YN} |
| Greater Yellowlegs 1 | * Kiskadee F.C. 3, 2 |
| Willet, A. ^{Young} | Weeds F.C. 1, 2 |
| * Black-Necked Stilt 2 | Horned lark A. |
| * Ring-Billed Gull 1 | Cactus Wren |
| * Bronze Cowbird C | Mockingbird A. |
| Brown-Headed Cowbird | Curve-Billed Thrasher A |
| Boat-Tailed Grackle A. | House Sparrow A |
| Cardinal 1 2 | E. Meadow lark A |
| * Texas Sparrow C | Red-Winged Blackbird 3C |

Lark Sparrow

* Botteri's Sp.

Cassin Sp. C

Desert Sp

Verdin, 1, 1

Painted Bunting: 1

Great Blue Heron 1

White-Winged Dove

Turkey 2

Groove-Billed Ani 1

White-Tailed Hawk. 2

Barn Swallow 1

R.D. Sage
1964

9 mi E. Cuernavaca

Morillo, Mexico

Canyon de Lobos

Black Vulture

Turkey Vulture

Red-Tailed Hawk

Chachalaca

Ground Dove

Inca Dove

Squirrel Cuckoo

White-Collared Swift

Fork-Tailed Emerald Hum.

Violet Crowned Hum.

Russet-Headed Motmot

Golden-Cheeked WP.

~~Blue~~ Throated Becard

Vermillion F.C.

Thick-Billed Kingbird

Pale-Throated F.C.

Western Wood Pewee

Empidonax sp.

Myopagus viridicatus

Beardless FC.

Rough-Winged Swallow

Maggie Jay

Banded ~~Barn~~ Wren

Canyon-Wren

Blue Mockingbird

Gray's Robin

Golden Vireo

Fan-Tailed Warblers

Bronzed Cowbird

Streak-Backed Oriole A

Yellow Grosbeak

Melospiza Kieneri

Aimophila ruficauda

R.D. Sage

1964

13 August

1 mi S.E. Tamasulapam, 6200'±, Oaxaca, Mexico

Turkey Vulture 4

Red-Tailed Hawk 1

Plain Chachalaca (heard)

Mourning Dove 10+

White-Winged Dove 2

Common Road-runner (heard 2)

Great-Horned Owl (heard 1)

Nutting's F.C. 2

Beardless F.C. 2

Empidonax 5

Tropical Kingbird 2

Contopus richardsoni 2

Common Raven 6

Scrub Jay 5

Black-Eared Bush-tit 10+

Rock Wren 2

Bewick Wren 6+

Canyon Wren 2

Spotted Wren 3

Ocellated Thrasher 16+

Curve-Billed Thrasher (heard 2)

Mockingbird 24

Turdus sp. 3

Blue-Gray Gnatcatcher 8+

Gray Silky F.C. 10

Bell Vireo 9

Rufous-capped Warbler 7 (young)

Wagler Oriole 1

Black-Headed Grosbeak 4

House Finch (c)

Lesser Goldfinch

Red-Eyed Towhee (c)

Brown Towhee (c)

Oaxaca Sparrow 7

Rufous-Crowned Sparrow 7

Black-Chinned Sparrow c

August 25

Chipping Sparrow - flock 80+
- 20+

Canada Warbler - 12

Wilson Warbler - 10

Calothrix - 5+

Cassin Kingbird 1

4-10 E. of Tehuantepec, via Hwy 190, Oaxaca, Mexico

18-23 August

Green Heron 1, -, 1, -, -, -	Blue-Black Grosbeak 1, -, -, -
Common Egret 1, -, -, -, -	Ducks and 6, 40, 150, 200
Wood Ibis 3, 1, -, 3, -, -	Sumichrast Sparrow 10, 15, 15, 15
Turkey Vulture c, c, c, 2, 2, 2,	Amphispiza ruficauda 2, 15, 13, 14
Black Vulture c, -, c, 1, 1, 2	Citriline Trogon, 2, 1, 1, 1
Caracara 2, 2, 2, 2, 1, 1,	W. Wood Pewee, -, 1, 4, 1, -, 1
Bobwhite 2, 6, 2, 5, 3 (heard), 6 (heard)	Yellow-Billed Cuckoo, 1, -, -, -
Imperial Dove, c, c, c, c, c, c	Bronzed Cowbird, -, 1, -, -, -
Common Ground Dove c, c, c, c, c, c,	Icterus gularis, 3, 3, 7, 4, 6,
White Wing Dove c, c, c, c, c, c,	Rufous-Naped Wren, 6, 4, 3, 1, 4,
Leptotila sp. 2, -, 1, -, 1, 1,	Social Flycatcher, 6, 7, 4, 4,
Orange-Fronted Parakeet c, c, c, c, c, c,	Progne sp, 4, 4, 6, 4, 3
Amazon albifrons 2, 4, -, -, 2,	Black-Bellied Tree Duck, -, 3,
Groove-Billed Ani c, c, c, c, c, c, -	
Rufous-Rumped Ground Cuckoo (heard, heard), 6, 5, 4, c,	
Broad-Billed Hummingbird 1, 1, 1, 2, 1, 1,	Ruddy Breasted Cuckoo, -, 1, -, 3
Golden Fronted Woodpecker, 10, 6, 25, 4, 1	Parakeet, -, -, 1, 10, 3, 1
Tropical Kingbird, 2, 4, 4, 4, 2, 3,	Ferruginous Pygmy Owl, -, (heard), (heard)
Whiskered F.C. 3, 6, 9, 11, 10, c,	Mangrove Cuckoo, -, -, 3, -, -
Myiarchus nuttingi 3, 4, 2, 3, 4, 4,	Roadrunner, -, -, 1, 2, -
Maggie Jay 6 (heard), 2, 3, 3, 5,	Roadside Hawk, -, -, -, 2
Banded Wren 3, 4, -, -, -, -	Yellow Warbler, -, -, -, 2
Tropical Mockingbird 2, 8, 7, 10, c, c,	
White-Lored Gnatcatcher c, c, c, c, c, c,	
Boat-Tailed Grackle 5, 6, c, c, c, c,	
Striped Baked Oriole 2, 4, 4, -, 4, 4,	
Lacloncher Bunting 5, 3, -, 3, -, -	

28-29 August San Blas, 0-100'±, Nayarit, Mexico

Brown Pelican 10	Herring Gull 10+
Maraceous Cormorant FC	Red-Billed Pigeon 10
Anhinga 8-10	Talpacote Ground Dove C
Magnificent Frigate Bird 15+	Orange-Fronted Parakeets 15+
Green Heron, C (y)	Parakeet 2
Little Blue Heron 10	Cinnamon Hummingbird 1
Common Egret c	Citrine Trogon 1
Snowy Egret c	Green Kingfisher 5+
Tri-Colored Heron 10+	Belted Kingfisher 1
Yellow-Crowned Night Heron 1	Be <u>Mornotus mericanus</u> head 2
American Bittern 1	Tropical Kingbird 1
Wood Ibis 1	Social FC c
Glossy Ibis 2	K. Skader FC c
White Ibis c	Mangrove Swallow c
Rosate Spoonbill 2	Jinaloa Wren 5
Black Vulture c	Yellow-Winged Cuckoo c
Turkey Vulture 2	Boat-Tailed Grackle C
Common Oystercatcher 2	Groove-Billed Ani 2
Snowy Plover 1	Grayish Saltator 1
Black-Bellied Plover 5+	House Sparrow 4+
Wilson Plover c	White-Collared Seedeater 4
Whimbrel 2	Mexican Crow - 10+
Marbled Godwit 4	
G Yellow Legs 4	
Willet c	
Ruddy Turnstone 10	
Sanderling c	

16 mi N. Navajoa, 200 ft⁺, Sonora, Mexico

Gambel Quail (heard)

Mourning Dove 5+

Great Horned Owl (heard 2)

Lesser Nighthawk (c)

Gilded Flicker 1

Gila W.P. 7+

Myiarchus sp. (c)

Olivaceous FC 1

Western Kingbird 2

Verdin 4

Cactus Wren (c)

Curve Billed Thrasher (c)

Mockingbird 2

Black-Tailed Gnatcatcher 2

Icterus sp 3

Lark Sparrow 2

Amphispiza carpalis c

Painted Bunting 1

20 mi E Mazatan

Sonora, Mexico

Turkey Vulture 1

Cardinal 5

Elegant Quail c

Black Headed Grosbeak 8

White-Wing Dove c

Varied Bunting 8+

Mourning Dove c

Brown Towhee 6

c. Ground Dove c

Five Striped Sparrow 17

Yellow-Billed Cuckoo 5

Lesser Nighthawk 1

Hummingbird? 2

Coppery Tailed Trogon 3

Gilded Flicker (heard 2)

Ladder-Backed Woodpecker 1

Gila Woodpecker 2

Vermilion FC 3

Western Kingbird c

Empidonax 3

C. Raven 2

Cactus Wren c

Cañon Wren heard

Curve-Billed Thrasher (heard)

Blue-Gray Gnatcatcher 2

Black-Tailed Gnatcatcher 1

Belt Vireo 2

Nashville Warbler 5

McGillivray Warbler 2

Yellow Breasted Chat 3

Icterus sp 3

Western Tanager 1

R.D. Sage
1968

Playa Cocor, sea level, Guanacaste, Costa Rica

8 July 1965

Brown Pelican, c, 5, 2, 2, 5

Magnificent Frigate Bird, c, 3, 2, 2, 4

Heron, 2, 4+, 2, 2, (heard 1),

White Ibis, 2, 2, 2, 2, x

Black Vulture, c, c, c, c, c

Turkey Vulture 3, 2, 10, 10, 3,

Colinus sp., heard 2, 1, 2 heard, x, x

Inca Dove heard, 4, 3, 3, 3, 3

Columbigallina talpacoti 2, x, 6+, 6+, 6+

Aratinga canicularis c, c, c, c, c

Amazilia sp. c, c, x, c

Playa cayana, 5, x, x, x, x

Crotophaga sulcirostris c, c, c, c, c

Chloroceryle aenea, 2, x, x, x, 1

Blue-crowned Motmot 1, x, x, x, x

Centurus sp. heard, heard, x, 2, 2

Kiskadee F.C. c, c, c, c, c

Tody F.C. x, 1, 8+, x, x

Calocitta Formosa 7, 3, 6+, x,

Camptylorhynchus rufinucha, c, c, c, x, 2,

Thryothorus sp. x heard 1, 1, 2, 2

Vireo flaviviridis x, 1, x, 2, 2, 2

Boat-tailed Grackle, 5-7, 3, 3, 5

Icterus sp. x, 1, 2, x, x

Sporophila torqueola x, 2, 2, 4, x

Volatinia jacarina x, 5+, 3, 3, 3

Amiophila ruficauda, 12-13, 7, 3, x

Common herpet. 1, x, x, 1, x

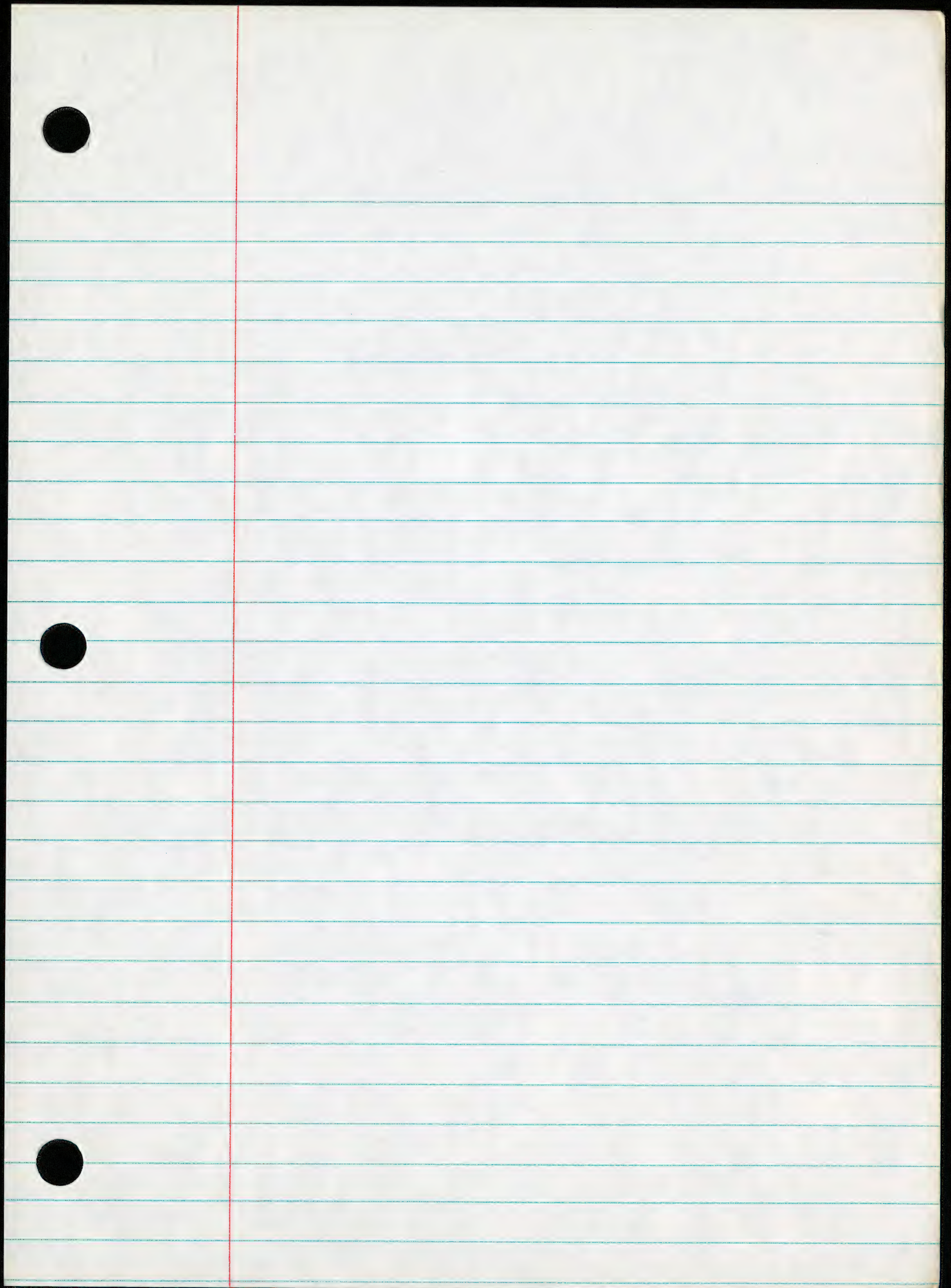
Brown booby, x, x, 2, 2, 2

Amoyitia nautula, 2, x, 1, x, x

Trogon melanocephalus? x, x, x, 1, x

White-winged dove, x, x, 1, 4, 1

Micropus myiarchus sp. x, x, 2, x, x



Pictures

Roll # /

Finished a roll that had shots from earlier in the spring. Last 2-4 shots were of habitat locality of Uma exul on 17 June. One or two before that were of the area where we put down cans in Arizona + of a baby mockingbird at some night.

Roll # 2

1 - 5 or 6	6 mi E. Malamoros	6/17/65
7-8	west of Sattilla	" "
9-10	South of Sattilla	6/18/65
10-11	south of San Luis Potosi ^{sunset}	"

- 1 on pass over Mex + Puebla 9000 ft.
- 1 yellow flowers south of Oaxaca
- 1 ~~the~~ village of Chile + ~~large~~ palm
- 2 valley of Oaxaca
- 2 village on road Arrasca in Chiapas
- 2 El Salvador along coast
- west of Lago Nicaragua - volcano Concepcion
- Volcano Irazu + regrowth. Views of
- San Jose + Cartago from the volcano 6/29
- (2) St Peters celebration in San Pedro 6/29/

UNIVERSITY OF CALIFORNIA
Museum of Vertebrate Zoology

June 1, 1947

EXPEDITION OUTFIT LIST

Check-list of equipment and supplies likely to be required on a field trip, compiled from lists of materials used on expeditions made during the past forty years.

Average quantities are given, for two months unless otherwise stated. Supplies listed in the following order: 1. Ammunition. 2. Traps. 3. Photographic outfit. 4. Materials used in preparation of specimens. 5. General outfit. 6. Cook outfit. 7. Groceries. 8. Personal outfit. 9. Automobile outfit.

1. AMMUNITION

Loaded auxiliary shells	7 per man per day
Loaded 16-ga. half-loads	
12 shot	3 per man per day
Loaded 16-ga. shells,	
6 shot	1 per man per day
Loaded 16-ga. shells,	
8 shot	1 per man per day
Loaded 16-ga. shells,	
10 shot	2 per man per day
Rifle shells as needed for special objectives.	

2. TRAPS

Mouse traps	100 per man
Rat traps (wired)	20 per party
Gopher traps (wired)	20 per party
Mole traps	1 per man
No. 1 steel traps	10 per party
No. 3 steel traps	5 per party

3. PHOTOGRAPHIC OUTFIT

Camera	1 per party
Camera case	1 per camera
Tripod	1 per camera
Tilting tripod top	1 per party
Focusing cloth	1 per camera
Exposure meter	1 per camera
Filters and holders	1 set per camera
Films	3 doz. per camera per month

4. MATERIALS USED IN PREPARATION OF SPECIMENS

(a) <u>Cotton</u>	
American	2 bats (2 lbs.) per man
Calif. Special	2 bats (5 lbs.) per man
Wadding	30 sheets per party
Absorbent	2 lb. roll per party
(b) <u>Wire</u>	
No. 26	1, 4-oz. spool per man
" 24	2, 4-oz. spools per man
" 22	2, 4-oz. spools per man
" 20	2, 4-oz. spools per man
Wire for wiring traps	
(c) <u>Scales</u>	
Double beam trip balance and weights	1 per party
Big Game scales	1 per party
(d) <u>Preservatives</u>	
Arsenic	3 lbs. per party
Formalin	2 qts. per party
(e) <u>Containers</u>	
Pill boxes or small vials	20 per party
2 qt. Mason jars	8 per party
Collecting Chest	1 per man
Plant press with blotters and papers	1 per party
Cloth bags (for snakes, etc.)	4 per man

(f) Miscellaneous Supplies

Skinning pans	1 per man
Specimen labels	400 per man per month
Skull tags	200 per man per month
Sawdust	15 lbs. per party
Applicators -	
6 in. & 12 in.	1 bundle per party
Chloroform	6 oz. per party
Magazines (Sat.Eve.Post)	12 per party
Muslin (colored, for trap markers)	10 yds. per party
Twine	1 ball per party
Excelsior	1 sack per party
Burlap sacks	6 per party
Large-headed black pins	800 per party
Cotton thread, No. 8 & 24 (white)	4 spools per man
Shipping tags	
Hypodermic for injecting specimens and blowing skulls	1 per party
Extra hypodermic needles	2 per party
First Aid kit	
Fly sprayer or Aer-a-sol bomb	
Fly spray	

5. GENERAL OUTFIT

(a) Equipment

Tent, 10 x 12 ft.	1 per party
Tarpaulin	2 per party
Table (folding)	2 per party
Chairs (folding camp)	1 per man
Shovel	1 per party
Hatchet or belt ax	1 per party
Ax	1 per party
Extra ax handle	1 per party
Hand saw	1 per party
Thermometer	1 per party
Barometer	1 per party
Dunnage bag for cotton	1 per party

Coleman gas lantern, and extra mantles	1 per party
Trap bags	3 per man
Canteen	1 per man
Rope, $\frac{1}{2}$ -inch and $\frac{1}{4}$ -inch	50 ft. per party
Hammer	1 per party
Flat file	1 per party
Nails, 4 and 6-penny	$\frac{1}{2}$ lb. per party
Tacks	1 package per party
(b) <u>Permanent Records</u>	
Notebook	1 per man
Notebook paper (filler, extra)	4 sheets per man per day
Census sheets, white	1 per man per day
Photographic record sheets	2 per man per month
Pocket field notebook	1 per man
Penholder	1 per man
Pen points	1 doz. per party
Pencils	3 per party
Higgins Eternal Ink	1, 2-oz. bottle per man
Directions for collecting Literature concerning region	1 set per man 1 set per party
(c) <u>Paper Supplies</u>	
Maps (topographic, when available)	1 set per party
Museum stationery (envelopes and letterheads)	
Postal cards	25 per party
Postage stamps	supply
Receipt book	1 per party

6. COOK OUTFIT

Gas stove, 2-burner	1 per party
Camp-fire irons	1 set per party
Stew pans (with covers)	3 per party
Frying pans	2 per party
Grabber	1 per party
Dish pans	1 per party
White gasoline (for stove or lantern)	

Coffee pot	1 per party
Cups	1 per man
Plates	1 per man) and
Knives	1 per man) 2 or 3
Forks	1 per man) extra
Spoons	1 per man) per
	) party
Mush dishes	1 per man
Butcher knife	1 per party
Large cook spoon	1 per party
Large cook fork	1 per party
Can openers	2 per party
Wash basin	1 per party
Water pail	1 per party
Dish towels	
Dish rags	

7. GROCERIES

(Suggestions only; quantities according to supply facilities.)

Cream of Wheat	Butter
Rolled Oats (also used for bait)	Crisco
Canned milk	Cooking oil
Dried milk	Bacon
Pancake flour	Ham
Cornmeal (also used at times for skinning)	Canned soup
Macaroni	Canned fish
Dried pudding or jello	Canned peaches
White flour	Canned apricots
Baking soda	Canned pears
Salt (extra for preservative)	Canned pineapple
Pepper	Fruit juices
Syrup	Raisins
Sugar	Dried apples
Chocolate	Dried peaches
Coffee	Dried prunes
Tea	Dried figs
Eggs	Walnuts
Beans	Canned corn
	Canned tomatoes
	Canned peas

Rice
Potatoes
Fresh vegetables
Onions
Ketchup

Jelly
Cookies
Crackers, soda
Crackers, graham
Bread

Ivory soap
Soap powder
Matches
Steel wool
Paper towels
Toilet paper

8. PERSONAL OUTFIT

16-ga. double barrel
shotgun in case
.22, .39 and/or .410
auxiliary barrel
Rifle and pistol if
needed for special
objectives
Scalpels - 2
Forceps - 2
Wire cutters -1
Scissors - 2
Tooth brush (for small
mammals) - 1
Scraper (peach
pitter) - 1
Needles (assorted
sizes) - 10
Egg blowing outfit
Carborundum stone
Steel millimeter tape - 1
Millimeter rule - 1
Fountain pen - 1
Pencil - 1
Hunting license
Collecting permits
(Federal & State)
Stamps

Envelopes, paper and
postal cards
Expense account sheets
Watch
Tooth brush
Comb
Mirror
Razor
Shaving brush and cream
Extra glasses and case
Colored glasses
Binoculars
Flashlight (extra bulb
and batteries)
Cash
Clothes (in addition to
what are worn)
Underwear
Socks (4 pr. at least)
Pants
Hunting coat or vest
Shoes (extra laces)
Hat or cap
Handkerchiefs
Shirts
Sweater
Belt

Clothes (cont'd)

Suspenders
Towels
Wash rag
Dunnage bag
Sleeping bag

Mosquito net

Compass
Pocket knife
Snake bite kit
Medicines
Knapsack or pack frame

9. AUTOMOBILE OUTFIT

Automobile or truck	1 for each 3 men
Mileage record book	1 per car
Extra tires	2 per car
Extra inner tubes	2 per car
Cup grease	1 can per car
Extra gasoline	2 to 25 gallons
Funnel	1 per car
Water cans	5 to 20 gallons
Extra valve cores	6 per car
Extra valve caps	6 per car
Jack	1 per car
Extra fuse	1 per car
Extra light bulbs	2 per car
Tire pump	1 per car
Chains	1 set per car
Tow rope	1 per car
Fire extinguisher	1 per car
Keys	1 set per man
Tire repair outfit	1 per car
Tool set	1 per car
Gasoline credit card	1 per car

Ward C. Russell